Badger Meter Europa GmbH

LMS RF High-End

Oil Management System RF High-End

USER MANUAL

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1. Basic safety recommendations

Before installing or using this product, please read this instruction manual thoroughly. Only qualified personnel should install and/or repair this product. If a fault appears, contact your distributor.

Installation
Do not place any unit on an unstable surface that may allow it to fall.
Never place the units above a radiator or heating unit.
Route all cabling away from potential hazards.
Isolate from the mains before removing any covers.

Power connection
Use only the type of power source suitable for electronic equipment. If in doubt, contact your distributor. Ensure that any power cables are of a sufficiently high current rating.
All units must be earthed to eliminate risk of electric shock.
Failure to properly earth a unit may cause damage to that unit or data stored within it.

Setup & operation
Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage, incorrect operation or loss of data.

Cleaning
Switch off all units and isolate from mains before cleaning.
Clean using a damp cloth. Do not use liquid or aerosol cleaners.

Repair of faults
Disconnect all units from power supply and have it repaired by a qualified service person if any of the following occurs:

- If any power cord or plug is damaged or frayed
- If a unit does not operate normally when operating instructions are followed
- If a unit exposed to rain/water or if any liquid has been spilled into it
- If a unit has been dropped or damaged
- If a unit shows a change in performance, indicating a need for service.

2. Introduction

The Badger Meter High-End oil management system has been designed to control and monitor the consumption and inventory balances of automotive fluid products with minimal installation and programming costs. Badger Meter has used its years of expertise in the automated meter reading market to develop a modular control system utilizing RF communications.

The high end RF oil management system hardware consists of one master keypad and at least one dispense keypad as well as at least one radio frequency electronic preset meter (LM OG-RF). The master keypad handles serial communication between the PC or a host server (ERP system) and RF communication to the dispense keypads in the system. The system verifies the operator's pin number and validates the work order number, fluid quantities and the valid hose / meter.

The master keypad can communicate with up to 36 dispense keypads that can be positioned to support the workflow of the facility the best way. Each dispense keypad can control up to 24 meters. The system supports up to 16 tanks and 16 fluids as a part of the system configuration. The system supports 250 unique operator IDs and pin numbers.

The system utilizes spread spectrum frequency hopping RF technology to prevent communication problems with other equipment in the facility. The RF system will look for a clear channel for transmission to insure that there is reliable communications at all times. Communication distances are typically up to 100 m but can go up to 300 m with unobstructed line of sight. A remote antenna is available for situations where multiple buildings are involved in the installation.

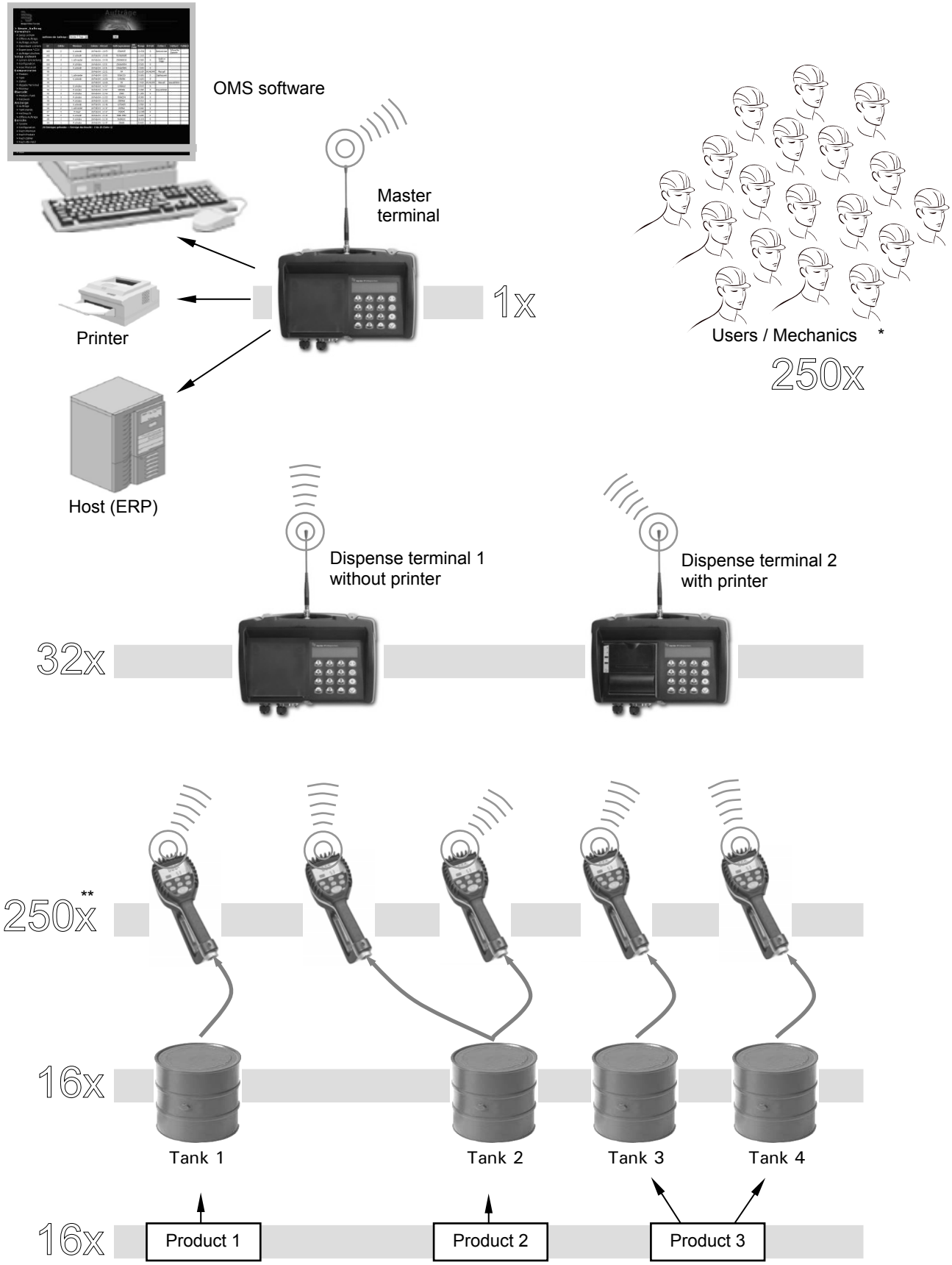
The PC is used to configure the system, maintain system data and enter work orders. The service desk would utilize the PC to enter a work order selecting the fluid and quantity required. The PC can stack as many work orders as required, limited only by the local memory of the PC. There is no need to predetermine where the work is going to occur. This allows the flexibility to service a vehicle at any open bay and select a meter when the work is going to be performed. When the work order is going to be performed the service personnel simply enters their pin number, work order and hose that is going to be used at the dispense keypad.

There are a number of system utilization reports by user; fluid type, tank or meters available for the system's management.

Optionally the system can be connected with an ERP system via its RS-232 interface. The real-time communication is based on an open interface protocol (ASCII-code) and can be easily adapted to local conditions.

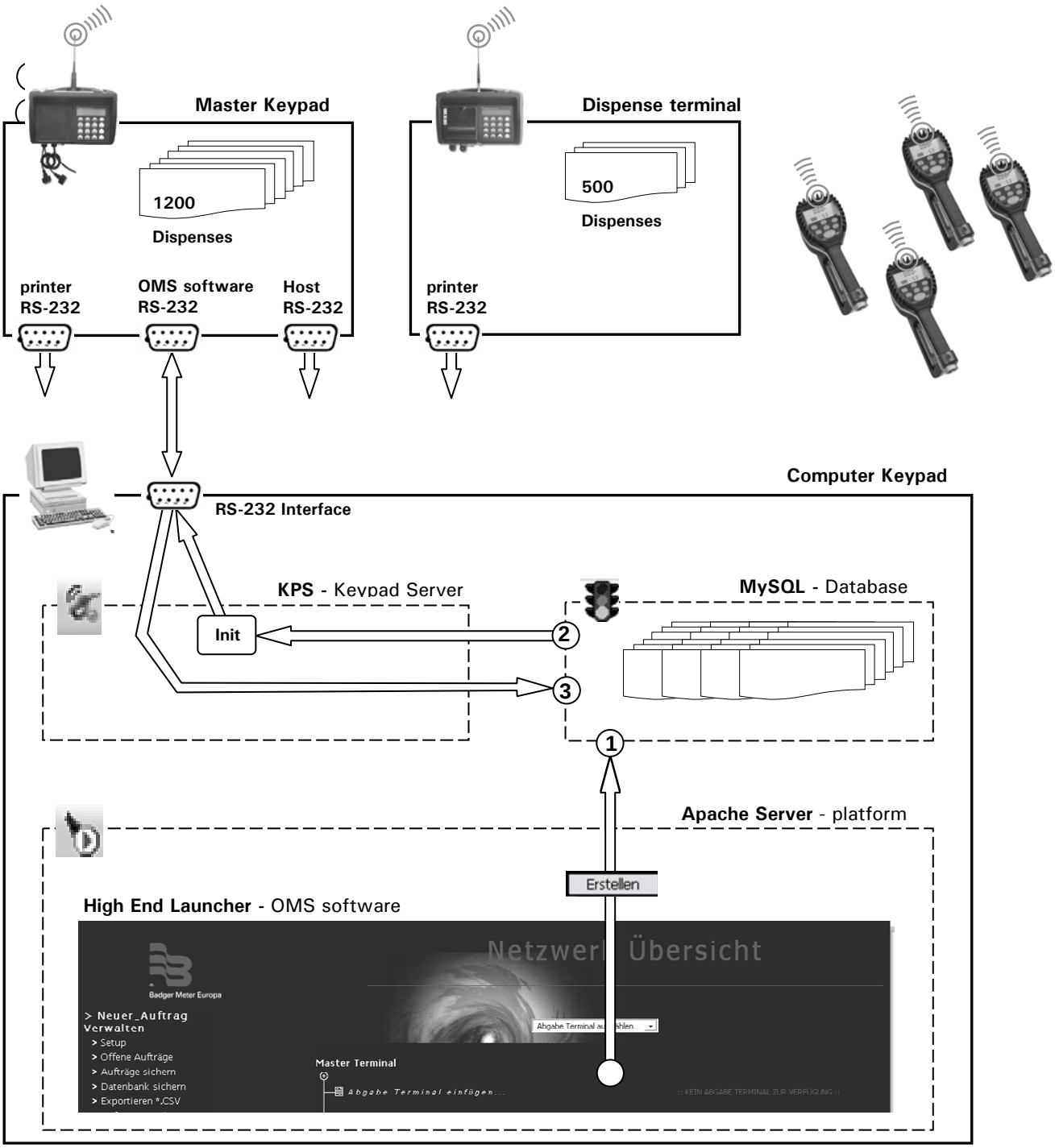
A unique, patented feature of the system is that the RF meter's dispense trigger is locked until an authorization from the keypad is received. After the dispense batch is completed, the user can top off if more fluid is required, the actual dispensed amount is sent back to the keypad and the meter returns to the locked status. Additionally, the meter can be installed on portable dolly systems offering control and monitoring of high-cost lubrication products.

2.2. Overview



* The users have access to each meter / hose
** 24 meters per terminal but not more than 250 meters on the whole.

2.3. Composition and dataflow of the RF-System



The main data streams:

1 The OMS software stores the configuration data into the MySQL database.

2 By using the menu Edit / Init of the KPS software the configuration data are being processed to the master keypad and finally via radio to all dispense keypads.

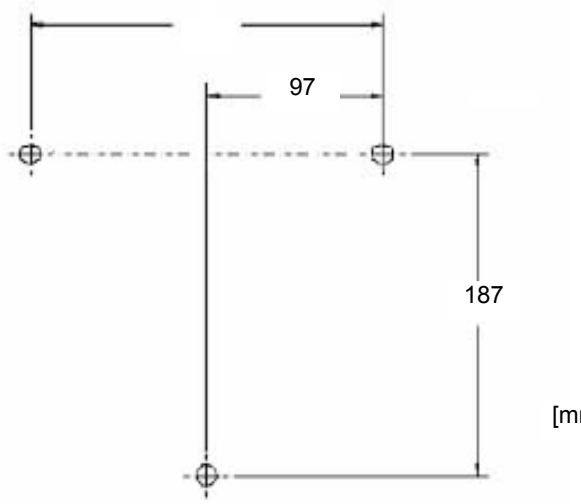
3 The KPS records all dispenses in the MySQL database.

2.4. Technical data

Power supply	230 VAC 50/60 Hz (Glas fuse 5x20mm 200mA T)
EMC-approval	EN300 220-1
RF communication	2-way 868MHz according to FCC part 15.247 and part 15.109 16 bit encryption
Operating temperature	-10° C to +60° C
Internal printer	Thermal printer Type FT190 (optional)
External printer	Epson LX300 or similar (optional)

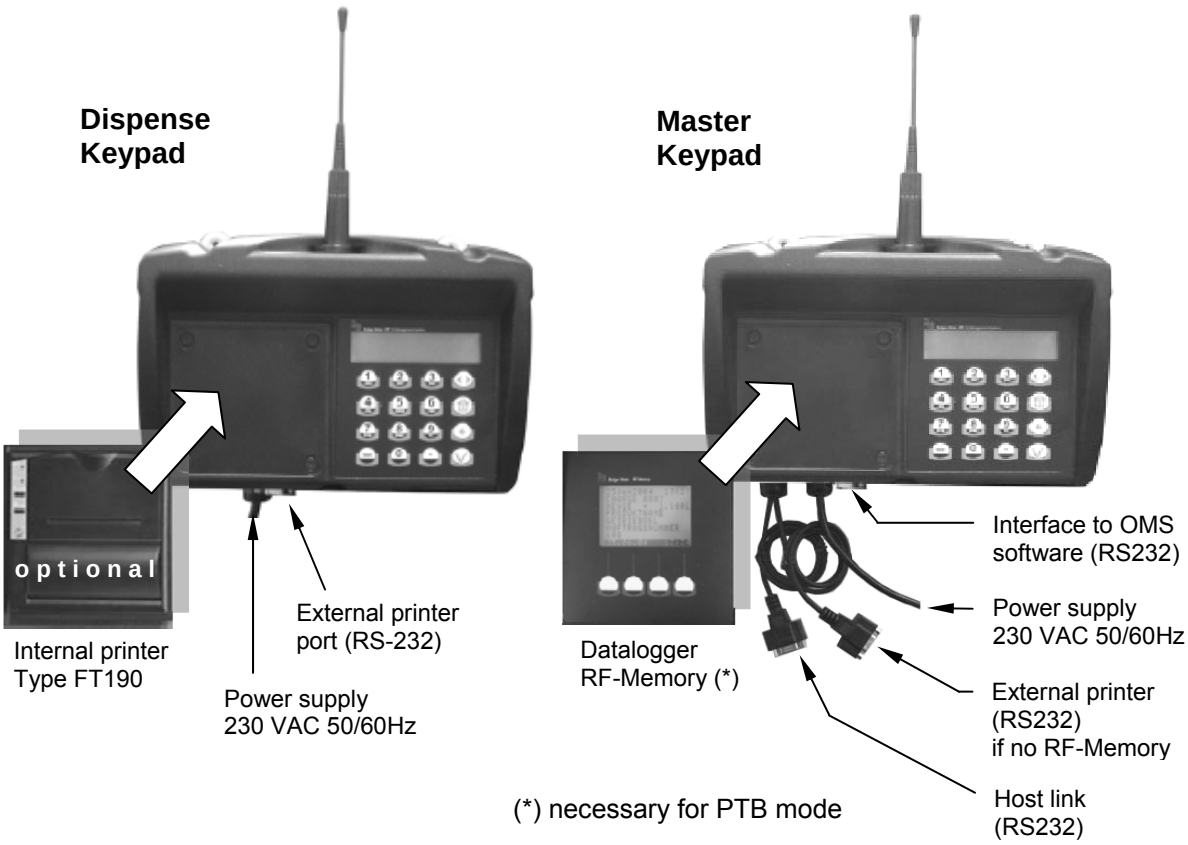
2.5. Wall fastening of the keypads

The keypad should be mounted upright with the antenna pointing upward, near a 230 VAC electrical socket, to a structurally sound wall through the two holes on the top of the keypad casing. Height on the wall should be at eye level. Care should be taken to avoid mounting behind any steel objects (tool storage cabinets and metal chain linked fences) that may block the RF communication signal. Care should also be taken to avoid direct, significant heat sources.



Mounting dimensions for keypad
Bore diameter: 5 mm

2.6. Keypad description



Scroll key: Used to select options on the active display

Home key: Pressing this key will return display to the PIN number and time/date screens

Backspace key: Used to backspace when entering data

Enter Key: Used to enter data and move to the next screen

Space key: Used to enter a space character when entering data

Alphanumeric keys: Used to enter data on display. Hold down key until desired character is on display. Then release the key.

2.7. Operation modes

The configuration of the system is generally done by using the PC-based OMS software. Only some special functions like the operation modes are set at the master keypad.

2.7.1. RF-System with PC operation

In this mode the PC is used to configure the system entities and install the network. The PC will be used to enter work orders for processing and provide the queuing for future processing. When an operator processes a work order the PC will validate the work order number and provide the fluid and amount to be dispensed. The results of the dispense will then be stored on the PC.

2.7.2. RF-system with host operation

In this mode the PC is used to configure the system entities and install the network. The host will be used to enter work orders for processing and provide the queuing for future processing. It will also store the dispense results that have been completed. Dispense results can be additionally stored on the PC. When an operator processes a work order the host will validate the work order number and provide the fluid and amount to be dispensed.

2.7.3. Stand alone

Work orders will not be validated; each entered work order will be accepted by the system. Data will be stored in the master keypad's memory.

2.7.4. Calibrateable / PTB mode

Operation in accordance with the specifications of the Physikalisch Technische Bundes-anstalt (PTB) in Braunschweig.
Based on the German act of measurement and calibrating §13 from March 23rd 1992.

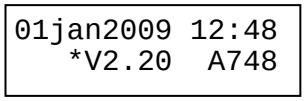
- detection of small quantities (less than 0,5 litres)
- detection of faulty impulses at the RF-meters
- Storing of the dispense data for at least 3 months in the data logger (RF-Memory).
- A PTB-approved meter is necessary (green keypad)

Note: Each meter can only be associated to one dispense keypad. All system users can access each of the dispense keypads.

3. Master keypad

The master keypad acts as the communications director for the RF communications. It handles all communications between the dispense keypads and the PC or Host. There are no operator menus associated with the master keypad only supervisor menus for setting up the system or creating reports.
To gain access to the supervisor menus the supervisor PIN has to be entered.

3.1. Standard screen



The standard screen shows the system date and software version number. The display will alternate between the standard screen and the enter pin number screen. The enter pin n° screen is used to access the supervisor menus.

A star ahead of the version number indicates the PTB approved mode.

3.2. Settings / supervisor menues

The following changes can only be made at the master keypad. All other settings can be changed by using the OMS software.

Enter the supervisor PIN to enter setup (default: 0000).

Enter PIN No. ____	+	Numeric xxxx

3.3. Menu INI: set date and time

Choose the menu INI and press enter.

Enter time --:--	+	Format hh:mm

Enter the actual time and press enter.

Enter Date --/jan/----	+	Format dd.mm.yyyy

Enter the date. Scroll from left to right through the fields by using the scroll key.
Enter behind the year <u>without</u> using the enter key.

You may see a message “Order List not Empty”
In this case you have to clear the transactions in the master keypad (CNF Menu).

Order List Not Empty	+ →	Clear Transacts **YES** / NO

3.4. Menu CNF (configuration)

The menu is used to set the system’s operation modes and archiving methods.

3.4.1. Work order validation

WO validation is used to define, if a work order shall be validated by the system before processing it.

Host validation *(host operation mode)* in this mode the work order number will be send to the aligned ERP (DMS) system. Only after validation from the system the meter will unlock. Afterwards the dispense data will be send to the ERP system.

WO Valid. HOST YES / NO	+ +

PC validation *(PC operation mode)* in this mode the work order number will be sent to the PC (OMS Software). Only after validation from the PC will the order number is accepted.

WO Valid. PC YES / NO	+ +

3.4.2. WO archive (Printout or storing of the work order/dispense results)

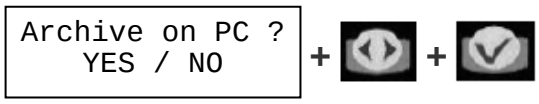
WO archived None Mem Print	+ +

Mem Data stored in an optional memory module (RF memory). The communication isproceeded via the PTB authorized B-protocol (EN 45501).

Print After each dispense, the data will be printed out on the external printer. Each line displays one dispense.

This function is disabled in the PTB-mode by default and cannot be enabled manually.

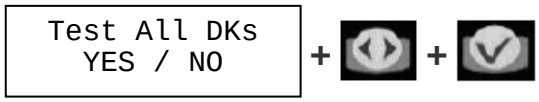
3.4.3. Archive on PC (Archive of the work orders/dispenses)



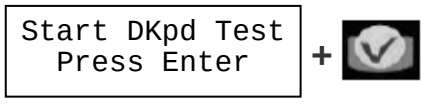
All dispense results will be stored on the PC (OMS Software). If the PC is currently not available, the data will tagged as “not sent” in the memory of the master. The data will be sent, as soon as the PC is connected again.

3.5. Menu DK (test communication)

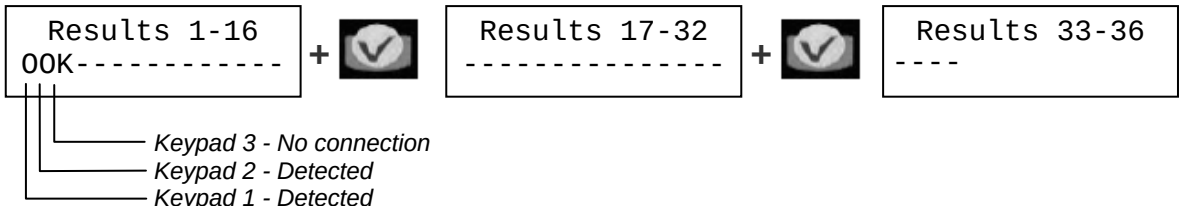
The menu is used to check the communication between all keypads.



In the following example each " - " stands for a Dispense keypad.



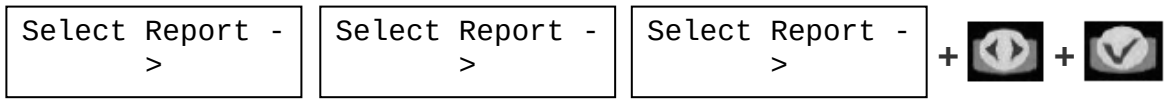
3 keypads are set up in following sample



Note: After the DK test you may have to reboot all dispense keypads, because the standard user login has been deactivated.

3.6. Menu REP (reports)

By using this function reports about the following subjects can be printed out by an external printer.



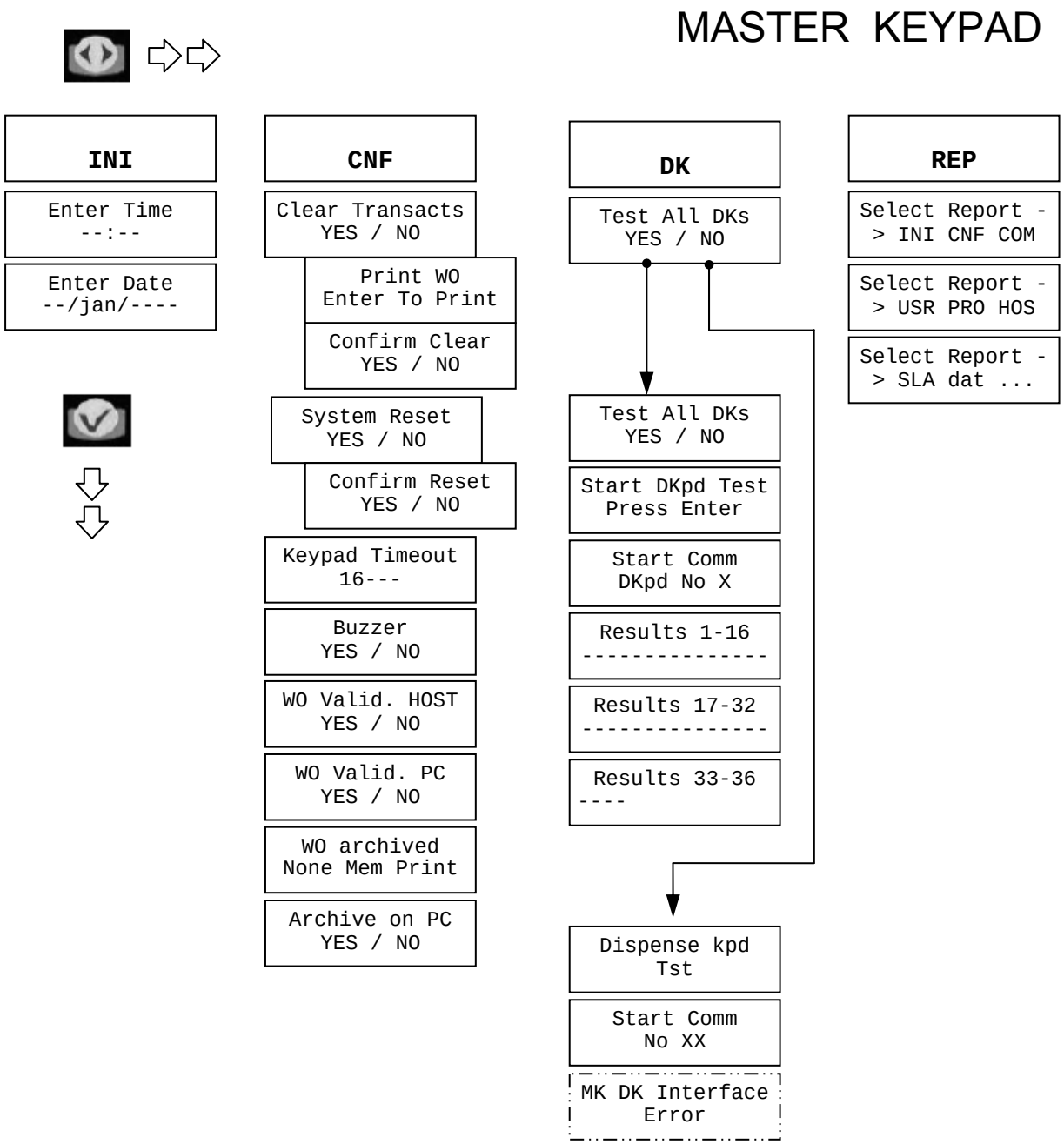
INI	Initialising	PRO	sort list by product
CNF	Configuration	HOS	sort list by hose (meter)
WO	sort list by work order	TNK	sort list by tank
USR	sort list by user	SLA	sort list by dispense keypad (slave)

An appropriate printer or a PC (terminal program) can be connected to the serial printer port (RS 232). Settings: 9600 Baud, Data Bits 8, Stop Bits 1, Parity None.

Note: If you are NOT able to enter this menu, you did not select the external printer (see chapter 2.4.2).

This function is disabled in the PTB-mode. Reports will automatically be stored in the data logger (RF-memory) at the master keypad.

3.7. Menu overview

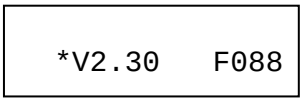

MASTER KEYPAD
INI
Enter Time --:--
Enter Date --/jan/----
CNF
Clear Transacts YES / NO
Print WO Enter To Print
Confirm Clear YES / NO
System Reset YES / NO
Confirm Reset YES / NO
Keypad Timeout 16---
Buzzer YES / NO
WO Valid. HOST YES / NO
WO Valid. PC YES / NO
WO archived None Mem Print
Archive on PC YES / NO
DK
Test All DKs YES / NO
Test All DKs YES / NO
Start DKpd Test Press Enter
Start Comm DKpd No X
Results 1-16 ----------
Results 17-32 ----------
Results 33-36 ----
Dispense kpd Tst
Start Comm No XX
MK DK Interface Error
REP
Select Report -> INI CNF COM
Select Report -> USR PRO HOS
Select Report -> SLA dat ...

4. Dispense keypad

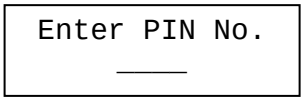
The dispense keypads are responsible for the communication with the RF-meters. The user starts a work order from the keypad. After the dispense operation has been completed the keypad will receive the actual amount dispensed from the meter. The dispense keypad then sends the dispense results to the master keypad.
The system can handle up to 36 dispense keypads. Up to 24 meters can be assigned to each keypad but each meter can only be assigned to one dispense keypad.

4.1. Standard screen

The standard screen shows the system date and firmware version number. The display will alternate between the standard screen and the enter PIN number screen. The “Enter PIN No” screen is used to access the system and to start a dispense or to access the supervisor menus.
A star ahead of the version number indicates the PTB approved mode.



Enter a user PIN to start a work order or the supervisor PIN to enter the supervisor menus (Default 0000).



4.2. Settings / Supervisor menu

The following configuration options are only available at the dispense keypad.
The default value for the Supervisor PIN is 0000 (four times zero).

4.3. Menu CNF (configuration)

4.3.1. System Reset

Resets the system parameters to original factory settings.

4.3.2. Mileage type

Defines the unit for the “Free Alphanumeric” field (see chapter 4.9.2, Pos.3).
Should be permanently defined in the OMS Software (see chapter 6.5.2 „Configuration“).

4.3.3. Top off timer

Specifies the amount of time, how long user can make additional dispenses. Is the time allowed after a dispense is completed before the meter will automatically lockout and send the dispense results back.
Should be permanently defined in the OMS Software (see chapter 6.5.2 „Configuration“)

4.3.4. Internal printer

Enables the internal ticket printer.
Should be permanently defined in the OMS Software (see chapter 6.5.2 „Configuration“)

4.3.5. External printer

Enables the external report printer port.
Should be permanently defined in the OMS Software (see chapter 6.5.2 „Configuration“)

4.3.6. Barcode scanner

This menu will define the external printer port as a barcode reader port (RS232), if the "External Printer" is enabled the "Barcode Scanner" menu will disappear.

Barcode Scanner YES / NO	Selecting YES will enable the Barcode Scanner
Scanner Locked OFF PIN All	OFF Data can be entered with keypad & barcode scanner PIN PIN has to entered by barcode scanner All All data have to entered with barcode scanner
Pin Encoded YES / NO	When PIN or All is selected you can choose an additional prefix character. The prefix character will not be displayed and cannot be entered on the keypad.
Encode Prefix#	Choose the desired prefix, available characters are: # $ % &´ ( ) * +, - Space / : ; < = > ? @ [ ] ^ ` { | } ! ″ #
Display Timeout 90-	Defines the time, how long the scanned information will be shown on the display.

Remark:
We can recommend the following barcode scanners.

Wall mounted: Datalogic Magellan 1000i
Handheld: Datalogic Firescan D131

Scanner has to be programmed according to our specification; Null modem adapter has to be used in between.

4.3.7. Buzzer

You can switch off the beep sound, each time you press a button.
Should be permanently defined in the OMS Software (see chapter 6.5.2 „Configuration")

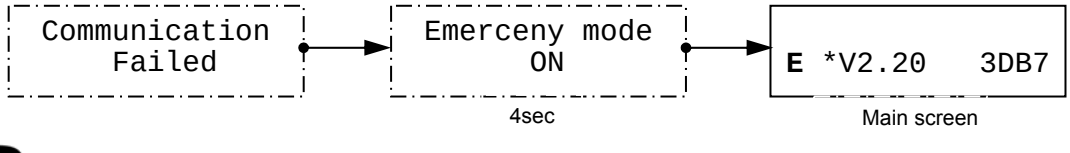
4.3.8. Emergency mode

In case the connection between master and dispense keypad is interrupted for some reason you have the possibility to set a dispense keypad into the emergency mode. The keypad is working then independently. The emergency mode will indicated with a capital E on the main screen beside the version number.

- All WO will be accepted, no validation.
- Data will be stored in the local dispense keypad.
- The dispense keypad will try with each new dispense to setup a communication with the master keypad. Once the master replies again the dispense keypad will automatically sent all the missing data and finishes the emergency mode (the "E" will disappear).

Emergency mode
YES / NO + +

If the communication failed you will see the character E on the main screen.



4.3.9. Batch quantity locked

Batch Qty Locked YES / NO

If enabled, the user can not change the quantity which has been predefined in the OMS software.

4.3.10. Hose ID First

Hose ID First YES / NO

Used for HOST communication option only.
Selected product ID will be sent to the HOST.

4.4. Menu MET (delete prepared WOs)

Work orders that have been entered at a keypad are being stored until they will be picked up by the appropriate meter (by pressing RESET at the meter). Meanwhile the meter is locked for other dispenses.

By using this menu these prepared work orders can be deleted to release the meter for new WOs.

Init All Hoses YES / NO

+ +

Reset All Hoses Press Enter

4.5. Menu REP (reports) - External printer

By using this function reports about the following subjects can be printed out by an external printer.

Select Report-> INI CNF ... WO

Select Report-> USR PRO HOS TNK

+ +

INI	Initialization Information	PRO	sort list by product
CNF	Configuration	HOS	sort list by hose (meter)
WO	sort list by WO	TNK	sort list by tank
USR	sort list by user		

An appropriate printer or a PC (terminal program) can be connected to the serial printer port (RS-232). Settings: 9600 Baud, Data Bits 8, Stop Bits 1, Parity None.

Note: If you are able to enter this menu, you did not select the printer (menu CNF).

Internal Printer **YES** / NO

4.6. Menu 190 (internal ticket printer)

By using this menu the configuration and status reports can be printed out by the internal printer FT-190 (optional)

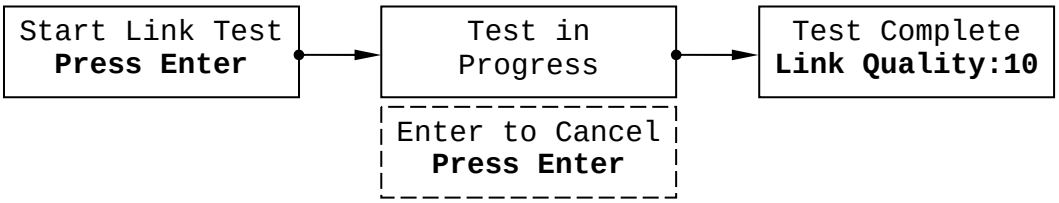
Menu	Example	Menu	Example
FLU	FLUID Adress: 258 Size: 18 1-> 1 / SAE10W40	PEN	Meter 1 inactive *(asking or unreachable)*
HOS	HOSE Address: 142 Size:12 1-> 0.036.700.715 / 1	PAR	Unit Km *(or Miles)* AN-Field Yes *etc.*
TNK	TANK Address: 194 Size: 8 1-> 10000 / LITER		
USR	USER Adress: 402 Size: 20 1-> 1234 / HR.MUELLER	MEM	Item Size Max Nb Address Between ---- ---- --- -- ------ --- ----- *etc.*
WO	WO 1 485801020230022B		

Note: For this feature to be used you must have selected internal printer option in the (Menu CNF)

```
Internal Printer
    YES / NO
```

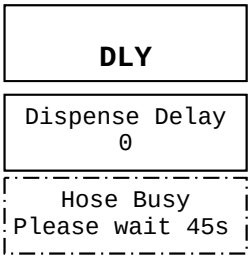
4.7. LNK (RF test between master and dispense keypad)

The LNK menu is used to check the quality of RF communication between master and dispense keypad.
The test will perform a number of test communications and measure the quantity of lost transmissions. The link quality 10 is the maximum you can achieve.



4.8. DLY (delays the meter after a dispense)

This function is only necessary, when a meter is used with a very high frequency and the dispense procedure has been accelerated with barcode data entry and the “Top off timer” set to zero. It will prevent from possible data collisions in this case (very seldom).

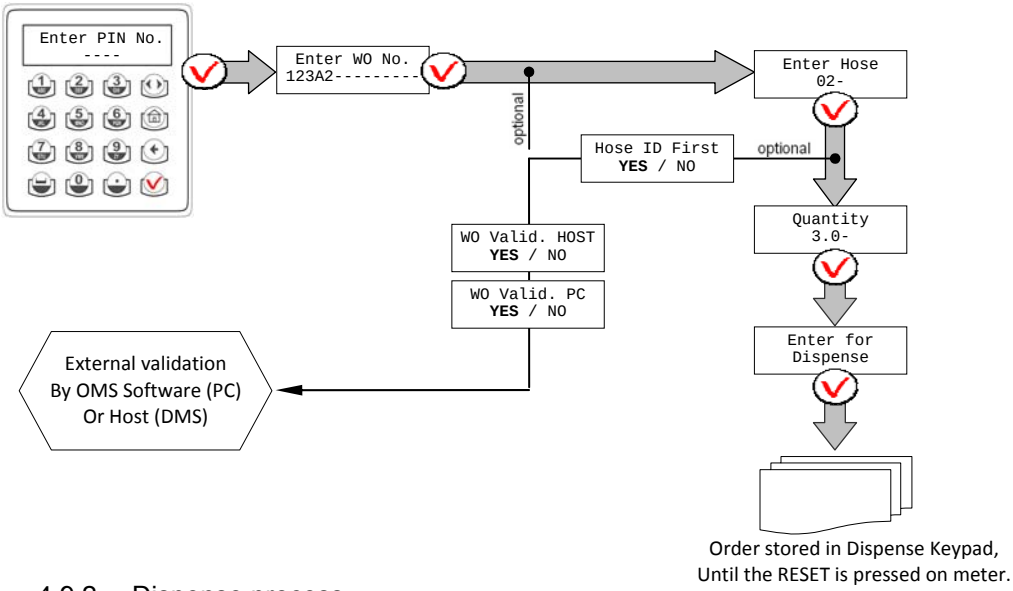


Available:
45-90-135 s

Press the to change the value (0=Default)

4.9. Dispense / Start a work order

4.9.1. Schematic overview



4.9.2. Dispense process

1.) Enter PIN No. ____ +

To start a work order a mechanic / user enters his PIN (see chapter 6.6.5 "User*").*

2.) Enter WO No. _____ +

Enter an alphanumeric number (max. 16 chars) and press Enter.

In the operation modes "WO Validation HOST" or "WO Validation PC" (see chapter 3.4.1 "Work order validation") the entered WO number will be compared with the numbers set in the system.
(Setting of work orders: see chapter 6.8 „Menu: ")

Alphanumeric keypad: To change from the numeric to the letter keypad, press the equivalent key for at least 3 seconds until the desired letter is shown.

3.) Enter additional free fields:

These optional fields are only shown, if they have been enabled (see chapter 6.5.2 „Configuration*").*

Free Alphanu. _____ +

Alphanumeric field, 10 chars:
Can be used for example for the licences plate number.

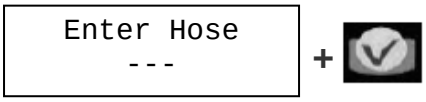
Free Numeric _____ +

Numeric field, 8 chars:
Can for example be used for the actual mileage

Alphanumeric keypad: To change from the numeric to the letter keypad, press the equivalent key for at least 3 seconds until the desired letter is shown.

4.) Meter selection

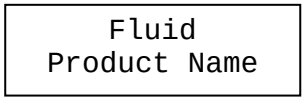
Enter a preset meter ID, for the product that is desired.



- Only meters that are assigned to the current keypad can be selected. *(See chapter 6.7.2 „Network tree“)*
- In the operation modes “*WO validation HOST”* or “*WO validation PC”* the system will check if the desired product is assigned to this work order *(see chapter 3.4.1 „Work order* validation *“).*

5.) Display fluid

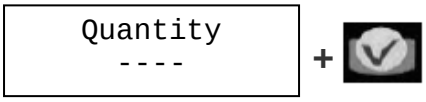
The chosen fluid type is shown for three seconds.



3 secs.

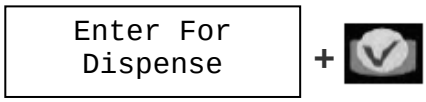
6.) Enter product quantity

Enter the desired quantity. Optionally, the quantity assigned to this WO is shown.



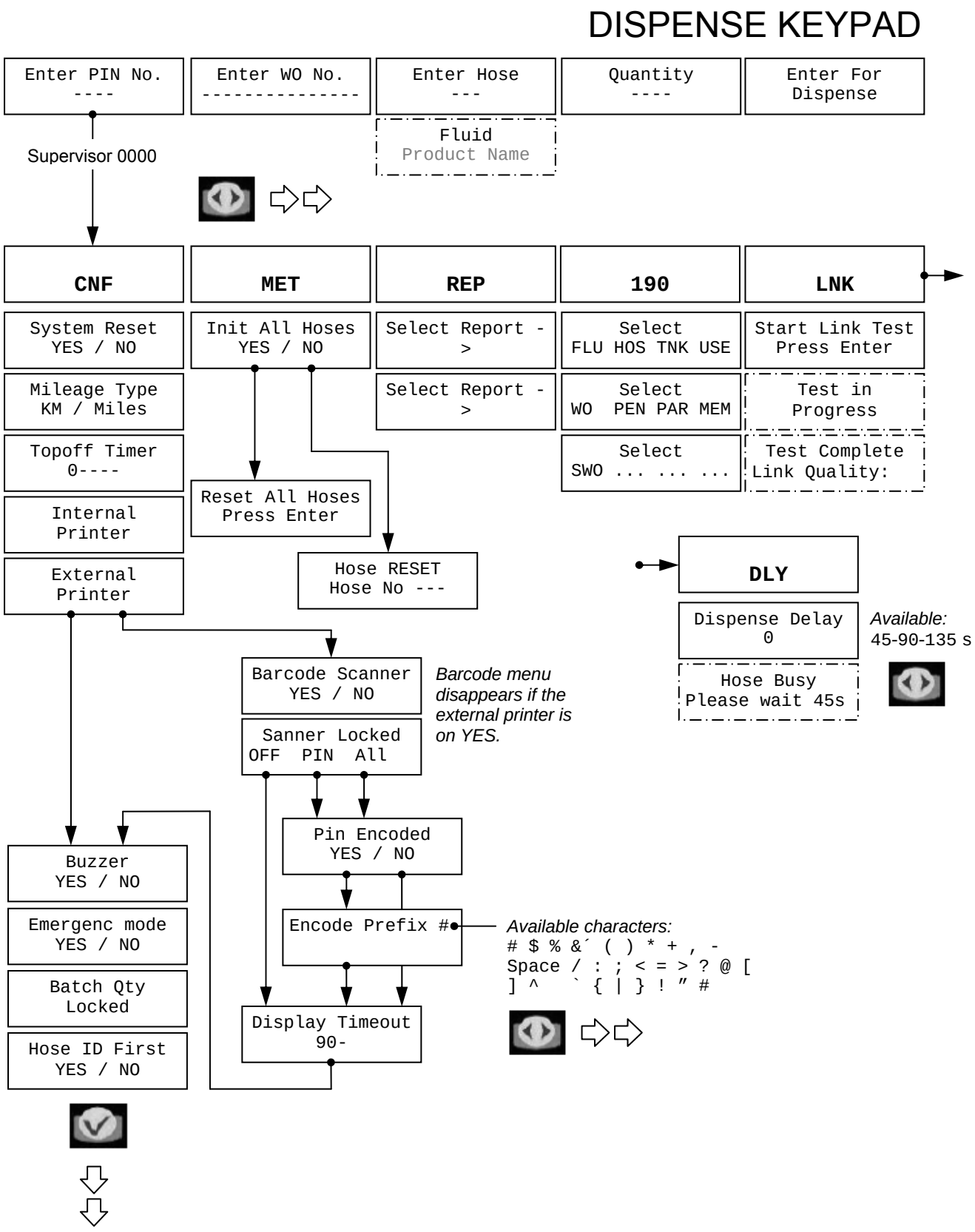
- The quantity can be chosen between 0,0 - 99,9 and 100 - 999 liters. The maximum quantity in the PTB-mode is 90,0 liters. A quantity less than 0, 5 liters will be not be accepted.
- The preselection can be made with one decimal place.
- For quantities of more than 100 liters will meter display will decrement.
- A quantity of 0.0 will deactivate the preselection on the RF meter. The RF meter will not latch and the user is required to hold the trigger in the open position to dispense fluid. The user must press RESET on the RF meter to complete the dispense operation and communicate the dispense order result to the keypad.

7.) Dispense confirmation



The work order is now ready for being picked up by the RF meter [see chapter 5.2 ”RF mode (standard preselection mode)”].

4.10. Menu overview



5. LM OG-RF meter

The meter is equipped with RF communications for communicating dispense authorization and result information. Once a work order has been set up, the operator simply pulls the trigger and the authorized amount of fluid for that meter will dispense. The valve will automatically shut off when the full quantity has been dispensed. A “Top Off” feature allows additional quantities to be dispensed and tracked after the valve closes. Upon completion of the dispense effort, the valve locks prohibiting any unauthorized dispense to occur.

For more detailed instructions, see the LM OG P manual delivered with the meter.

5.1. Key description

The following keys (except for RESET and SHUT-OFF) are only active in the AUTO mode (or Manual mode). The meter will autonomous as a standard preselection meter. How to enter this mode see chapter 5.3.1

Used to enter the dispense quantity to be used (10 liter steps).
In operational mode it shows the five latest dispensed amounts.

Used to enter the dispense quantity to be used (1 liter steps).

Used to enter the dispense quantity to be used (0.1 liter steps).
In operational mode it shows the actual dispense flow rate.

Used to display the accumulated fluid total and the resettable total when held for 3 seconds.

Used to enter and exit the auto mode when RF communications are not available.

Used to accept a dispense order from the keypad. Used in normal operating mode (RF, manual or auto) to clear the previously programmed batch and to reset the meter. Press the button while viewing the resettable total to set it back to zero.

The SHUT-OFF is used to stop the flow manually through an electrical override.

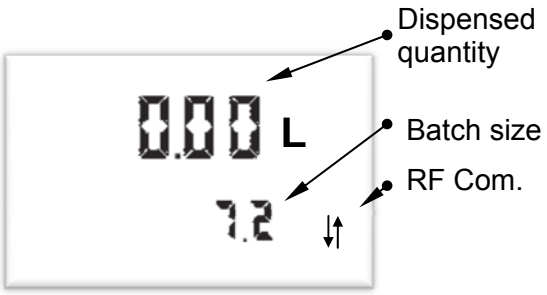
5.2. RF mode (standard preselection mode)

Work order validation via the dispense keypad.

When the battery pack is attached to the meter, the meter will automatically enter the RF mode. The trigger is in a locked-out position and no oil can be dispensed until a dispense order has been received by the meter.

5.2.1. Procedure

1. Press the RESET button on the meter to enable it to receive a dispense order provided by the dispense keypad. The trigger will unlock.

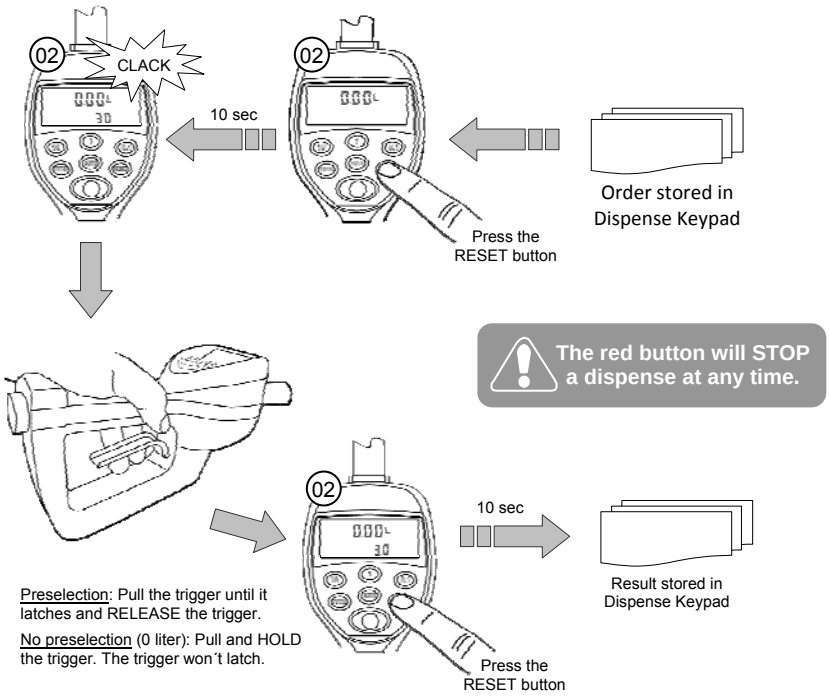


2. Pull the trigger to begin the dispensing of fluid. The valve will automatically lock in place, even though the trigger will fall back to the closed position. The flow will automatically shut off when the programmed amount has been dispensed.

3. To top off, pull the trigger to dispense fluid and release when the desired amount has been reached.

4. Press the RESET button when finished. The total quantity will be transmitted to the keypad and the meter will return to a locked-out position. The meter is now ready to receive the next dispense order from the keypad.

5.2.2. Illustration


02
CLACK
10 sec
02
Order stored in Dispense Keypad
Press the RESET button
The red button will STOP a dispense at any time.
02
10 sec
Result stored in Dispense Keypad
Preselection: Pull the trigger until it latches and RELEASE the trigger.
No preselection (0 liter): Pull and HOLD the trigger. The trigger won´t latch.
Press the RESET button

5.3. AUTO mode

Attention: This function allows unauthorized dispenses. The dispense information will not be associated to any mechanic / operator.

- Operation will take place as described in chapter 5.1.
- The total dispensed quantity will be stored under the general work order number (999999)
- The AUTO sign at the display's lower left corner indicates the manual mode

5.3.1. Procedure

Procedure only for authorized personnel!
Ask your service department for the procedure.

5.3.2. Reset to standard mode

To set back the meter into standard preselection mode, press the RESET button and start a communication with the assigned dispense (see chapter 4.2.1)
If the communication was successful (no "F02") the meter will lockout and fall back in the preselection mode. The total quantity, which has been dispensed during the AUTO mode will be automatically transmitted to the master keypad. It will be assigned to the "Misc.WO-Number" (Default 999999), the user is named as "???". The dispense result will be marked with the status 16 for manual dispense.

5.4. Electrical override

In case of an emergency or to interrupt a batch, the meter is equipped with an **electrical override**. This option automatically closes the valve in the meter, stopping the flow immediately. The display will begin to flash because the meter does not sense any flow. Batching can be continued after an override, even if the meter is in the middle of a programmed batch and the display continues to flash.

Press the red button to activate the electrical override. This button can only be used when the valve is open.

Press the RESET button to cue up the next batch and stop the display from flashing.

5.5. Changing the battery

When the batteries need to be changed, a progression of warnings will appear on the screen. The battery compartment is located on the underside of the trigger guard. Unscrew the two screws located under the guard and remove the battery cover to expose the batteries.

5.6. Programming the LM OG-RF meter

The units of measurement, scale factor can be changed. To enter / leave the programming mode, press and hold the "PROGRAMMING" key located in the access hole at the meter's bottom for 2 seconds.
To gain access to this key, a seal has to be broken.
For more detailed instructions, see the LM OG-RF2 manual delivered with the meter.

6. OMS High End software v2.21

The system configuration is generally done by using this OMS software. Only some special functions like the operation modes can be set at the Master Keypad.

The software provides the possibility to set work orders and assign a product and a quantity to it.

All dispense results will collected and saved in a work order list (REPORT BY WO). Several filters are available to select the desired information. The result can be exported to Excel (CSV).

6.1. Software installation

The OMS software for setting up and administrating the RF system requires Microsoft Internet Explorer. Please see that a current version is installed.

6.1.1. System requirements

- IBM compatible PC (minimum):
  Minimum 500 MHz processor
  Minimum 128 Mbytes RAM
  Minimum 75 Mbytes free hard disk space
- Microsoft Windows 2000 or Windows XP
- Microsoft Internet Explorer 6.0 or later
- Serial port RS-232

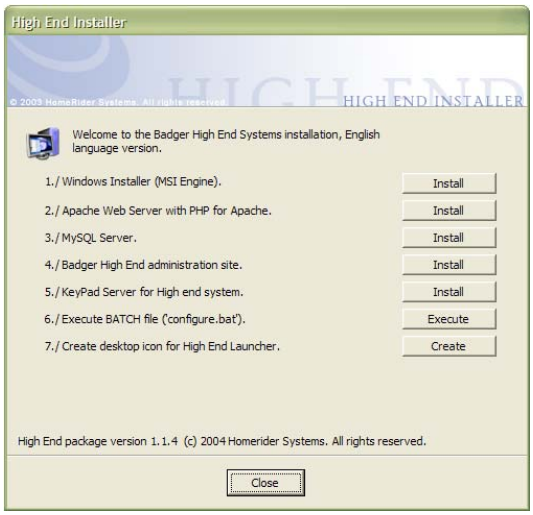
6.1.2. Installation

Before beginning the installation, please check, if your windows user profile has enough rights to install the software properly (particularly Windows XP).
(For further instructions ask your administrator and see chapter 8 „Troubleshooting“)

Insert the delivered setup CD ROM into your CD ROM drive.

If the High End Installer should not launch itself after a short period, open it manually by entering the path of your CD-ROM drive into the command line of your windows explorer and selecting the launcher.exe file on the CD-ROM.

The installation menu will pop up:


High End Installer
HIGH END INSTALLER
Welcome to the Badger High End Systems installation, English language version.
1./ Windows Installer (MSI Engine).
Install
2./ Apache Web Server with PHP for Apache.
Install
3./ MySQL Server.
Install
4./ Badger High End administration site.
Install
5./ KeyPad Server for High end system.
Install
6./ Execute BATCH file ('configure.bat').
Execute
7./ Create desktop icon for High End Launcher.
Create
High End package version 1.1.4 (c) 2004 Homerider Systems. All rights reserved.
Close

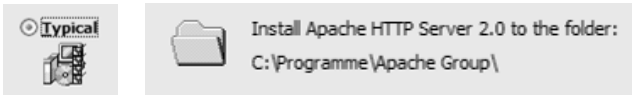
Depending on your system performance the installation can take several minutes. Pay attention that each action is finished properly (confirmation notice) before starting the next one. Finally leave the installation menu by clicking on the close button and restart your PC. (Power off!)

6.1.3. MSI Engine

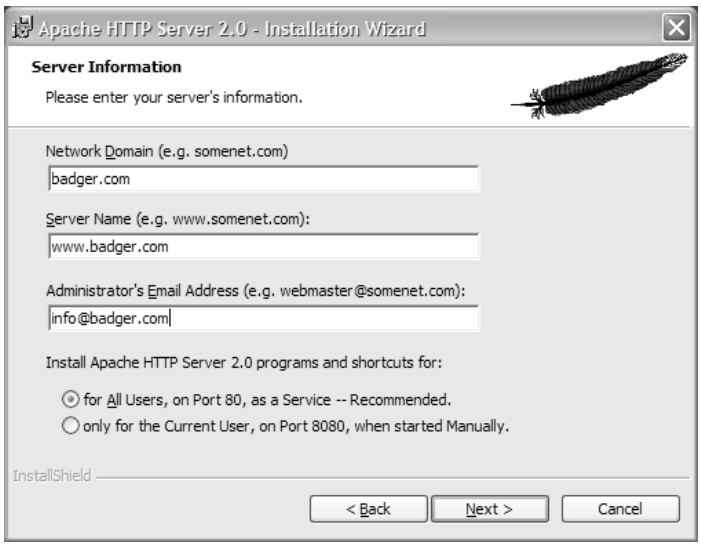
Under Windows XP this installer already exists. You can skip this installation.

6.1.4. Apache Web Server and PHP

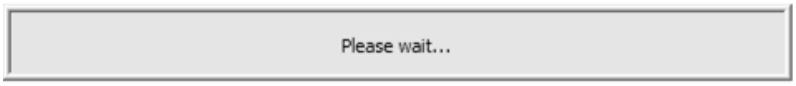
Follow the instructions. As installation mode choose “Typical".
Please use the recommended installation path.



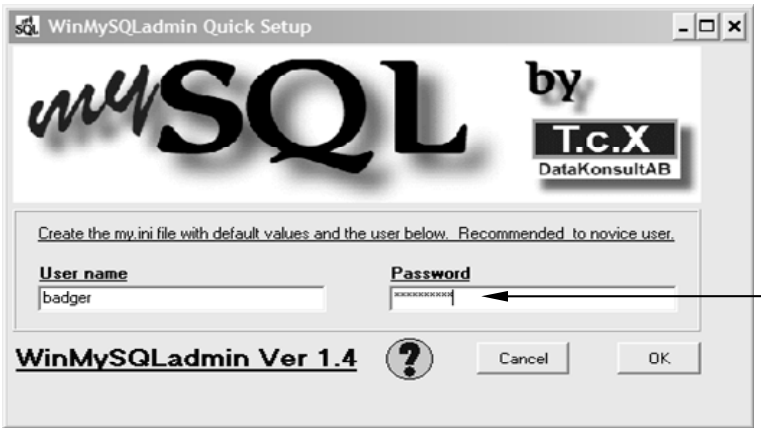
In step four enter the server information. The OMS Software does NOT use these data. Any data can be entered but pay attention to the syntax. (See the example).


Apache HTTP Server 2.0 - Installation Wizard
Server Information
Please enter your server's information.
Network Domain (e.g. somenet.com)
badger.com
Server Name (e.g. www.somenet.com):
www.badger.com
Administrator's Email Address (e.g. webmaster@somenet.com):
info@badger.com
Install Apache HTTP Server 2.0 programs and shortcuts for:
for All Users, on Port 80, as a Service -- Recommended.
only for the Current User, on Port 8080, when started Manually.
InstallShield
< Back
Next >
Cancel

Remark: After installing wait until the following message disappears (it may be in the back-ground).



6.1.5. MySQL Server

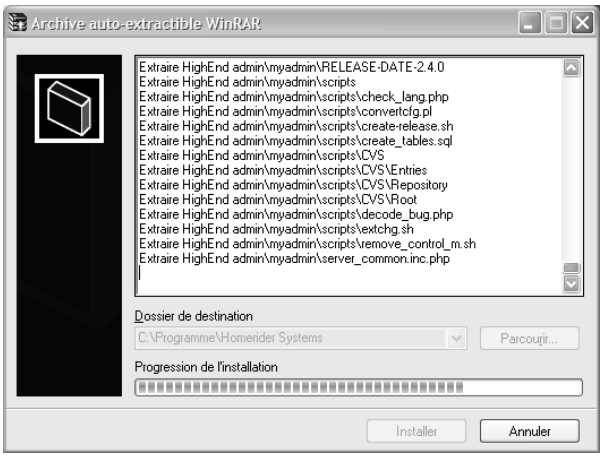


Password:
badger1981

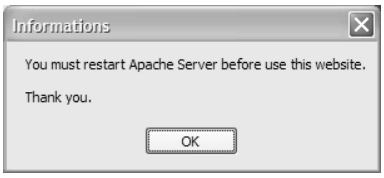
Installation of the data base, enter user name and password as follows.

6.1.6. Badger High End Administration Site

Installation of the website.

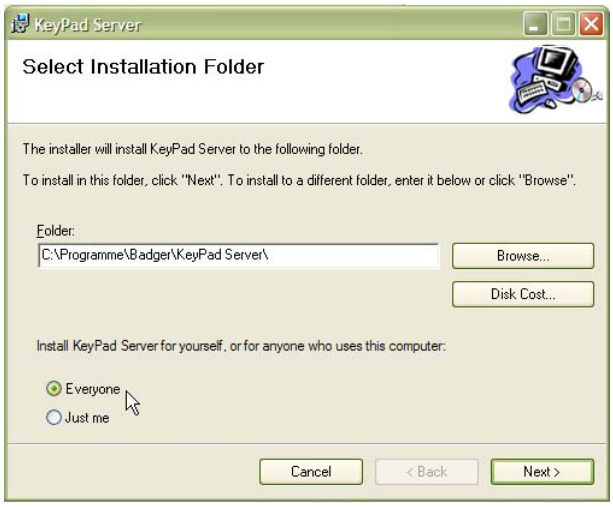


Confirm the following message and restart your PC.



6.1.7. Keypad Server (KPS)

Program for the communication between the data base (of the OMS software) and the master keypad. Select “everyone“ to give all users of the PC access to it.


KeyPad Server
Select Installation Folder
The installer will install KeyPad Server to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Programme\Badger\KeyPad Server\
Browse...
Disk Cost...
Install KeyPad Server for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

6.1.8. Execute Batch file

Adds special folder C:\temp

6.1.9. Create Desktop Launcher

Creates the "Desktop Launcher" icon at the desktop.

6.1.10. Uninstalling

Stop the KPS, Apache and MySQL

Open the CD with the Explorer and start the uninstaler.exe and follow the instructions.

6.2. System configuration

The following steps are necessary to set up the OMS High End system properly.

In the setup menu (chapter 6.5):

1.) Common settings like location, unit of measurement and language.
2.) (Process-) technical parameters of the keypads like time out, status reports, optional functions and the miscellaneous WO.

In the entity menu (chapter 6.6):

3.) Creation of the hardware components in the system
4.) Creation of users/mechanics in the system

In the tree menu (chapter 6.7):

5.) Assigning and linking the entities to each other

In the entity menu (chapter 6.6):

6.) Entering the actual tank levels

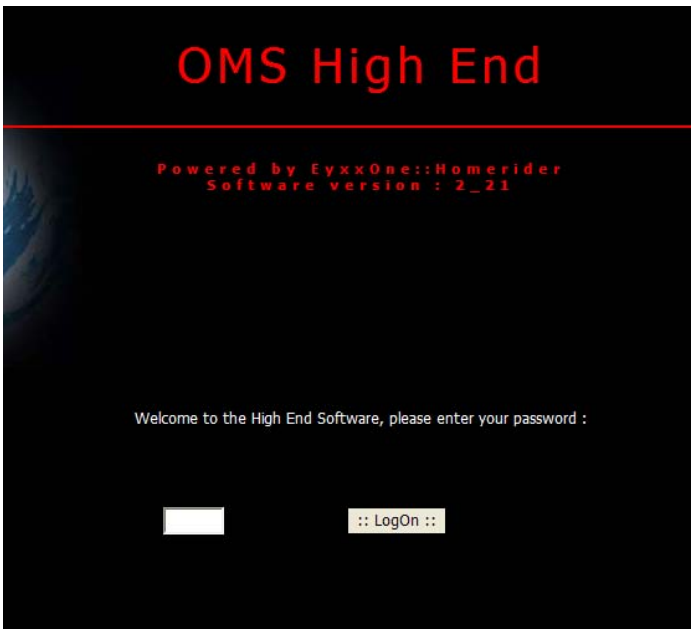
By using the KPS software (chapter 7):

7.) Transmit the configuration settings to the master keypad with the KPS Software

6.3. First start of the OMS software

To launch the software, click on the link on your desktop or enter *http://localhost* into the command line of your Internet Explorer.

Enter the 4-digit system password and click the LogOn button.
The system password is initially set to 0000 (four times zero).


OMS High End
Powered by EyxxOne::Homerider
Software version : 2_21
Welcome to the High End Software, please enter your password :
:: LogOn ::

6.4. Menu: Report by work order

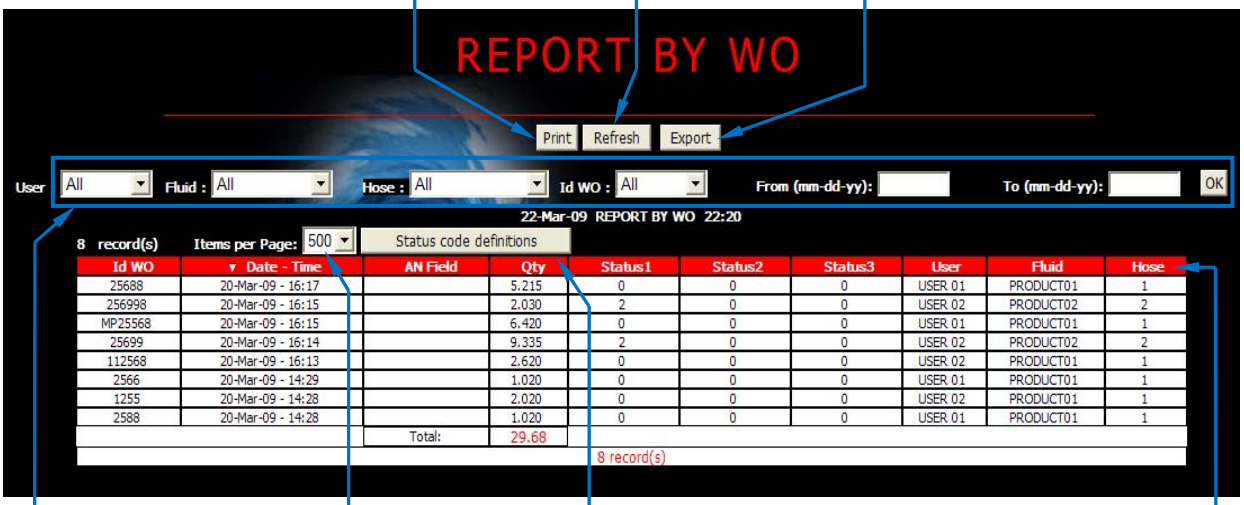
The report by work order will show all the finished dispense results.

The following functions are available:

Will print the current screen.

Will refresh the current screen.

The current list will be exported, see description below.


REPORT BY WO
Print
Refresh
Export
User All
Fluid : All
Hose : All
Id WO : All
From (mm-dd-yy):
To (mm-dd-yy):
OK
22-Mar-09 REPORT BY WO 22:20
8 record(s)
Items per Page: 500
Status code definitions
Id WO | Date - Time | AN Field | Qty | Status1 | Status2 | Status3 | User | Fluid | Hose
25688 | 20-Mar-09 - 16:17 | | 5.215 | 0 | 0 | 0 | USER 01 | PRODUCT01 | 1
256998 | 20-Mar-09 - 16:15 | | 2.030 | 2 | 0 | 0 | USER 02 | PRODUCT02 | 2
MP25568 | 20-Mar-09 - 16:15 | | 6.420 | 0 | 0 | 0 | USER 01 | PRODUCT01 | 1
25699 | 20-Mar-09 - 16:14 | | 9.335 | 2 | 0 | 0 | USER 02 | PRODUCT02 | 2
112568 | 20-Mar-09 - 16:13 | | 2.620 | 0 | 0 | 0 | USER 02 | PRODUCT01 | 1
2566 | 20-Mar-09 - 14:29 | | 1.020 | 0 | 0 | 0 | USER 01 | PRODUCT01 | 1
1255 | 20-Mar-09 - 14:28 | | 2.020 | 0 | 0 | 0 | USER 02 | PRODUCT01 | 1
2588 | 20-Mar-09 - 14:28 | | 1.020 | 0 | 0 | 0 | USER 01 | PRODUCT01 | 1
Total: 29.68
8 record(s)

The filter will give you the possibilty to select only the desired information. The result can be exported to EXCEL (*.csv).

The number of items you would like to see per page.

Additional information for each dispense result.

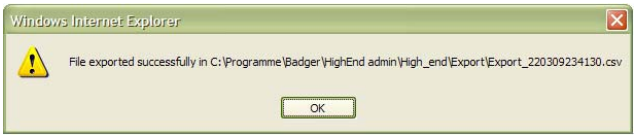
Status description:

0 ==> No error
1 ==> Checksum
2 ==> Timeout
4 ==> Low Batteries
8 ==> Counting
16 ==> Manual
32 ==> Unauthorized Dispense
64 ==> Out of sequence
128 ==> Unknown

Will sort the data by the selected column, indicated by a grey triangle in the header.

Export function:

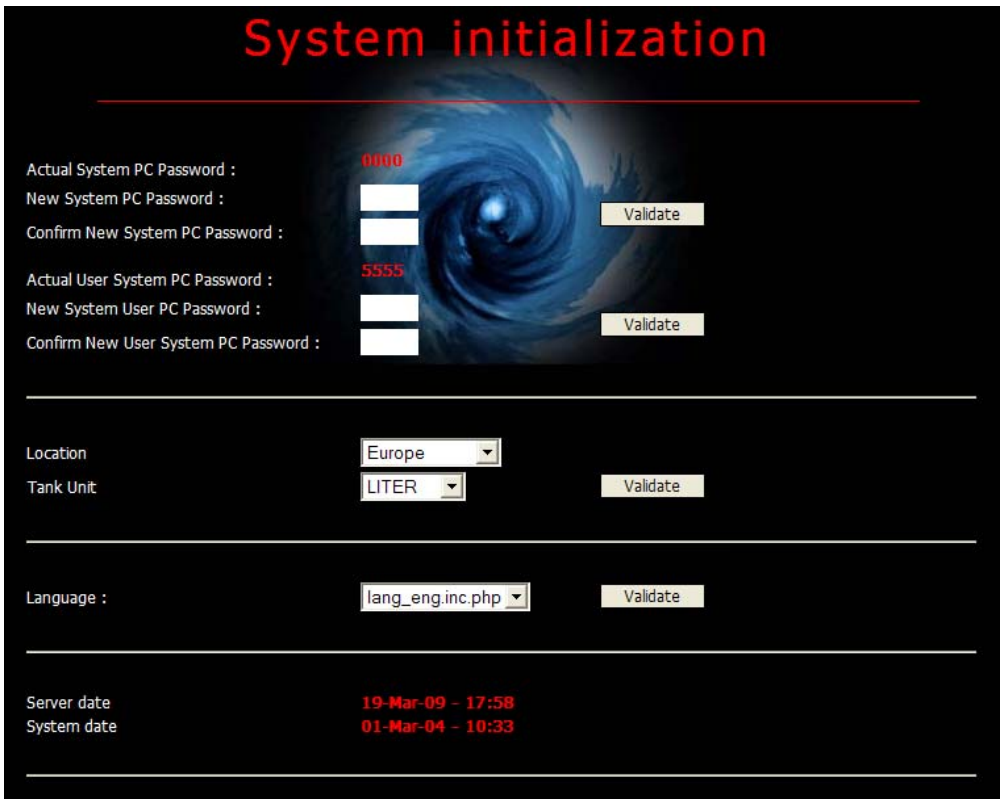
The Export button will create from the selected list a file (*.CSV ASCII-Code). A window will inform you about the location of the file.



The folder Export folder can be opened by selecting: Windows® START-Programs-Badger-Export

6.5. Menu: Setup

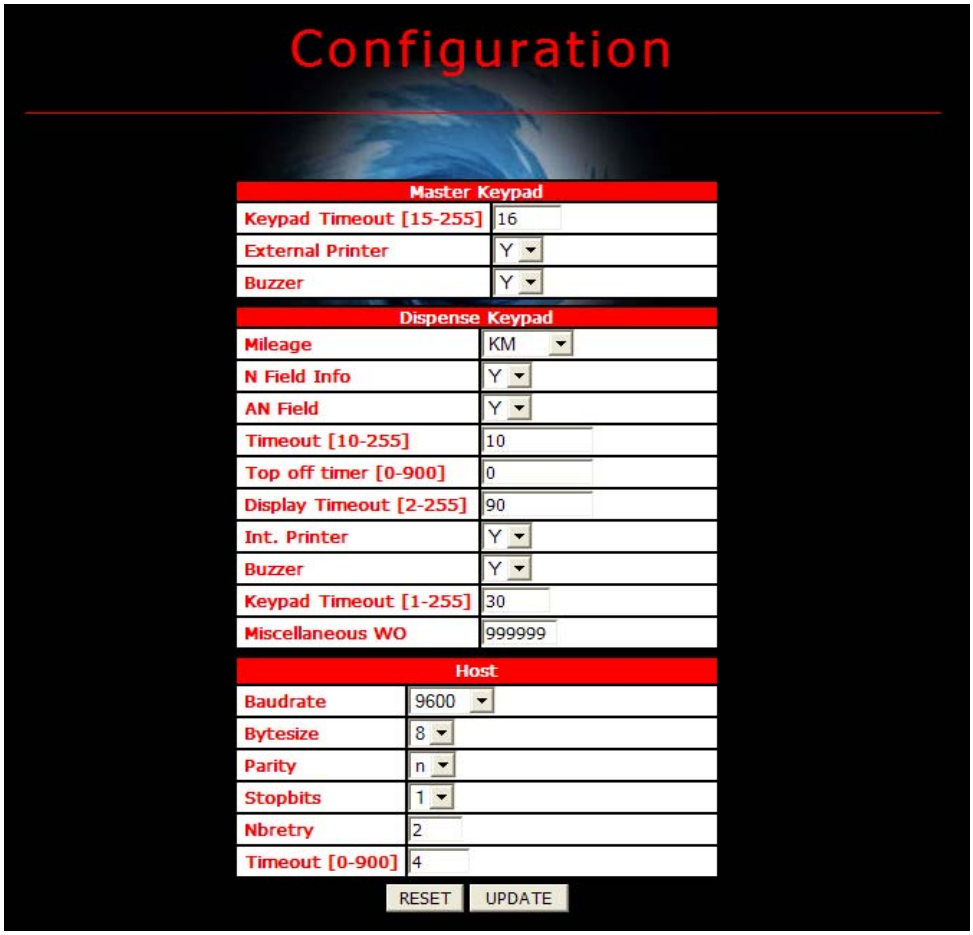
6.5.1. System initialization



1. Change the system PC Password. Enter the new password and repeat it in the box underneath. Click on “Validate” at the right.
2. You can choose between Europe (868MHz) and the United States (915MHz). After changing click on “Validate” at the right.

   The unit can be changed from LITER to PINT or QUART. Click on “Validate” at the right to save the change.
3. The software language can be chosen from the drop down menu. After choosing click on “Validate” at the right.
4. In this line date and time of the system and of the master keypad are shown. If they are differing strongly you should compensate them (see chapter 3.3 “Menu INI: set date and time“).

6.5.2. Configuration



Parameters Master Keypad		
Label	**Database**	**Comments/rules**
Keypad timeout <u>Should not be changed!</u>	• Master keypad timeout for communications with the PC. • If this timeout occurs, the dispense keypad with display the error message: "Master down"	Enter a decimal value from 15 – 255. One second increments. Default is 20 seconds
External printer RS232	• In the menu REP you can create reports sorted by WO, User, and Product etc. See chapter 3.6	YES/NO selection.
Buzzer	• A beep will sound after every button press on the master keypad keyboard.	YES/NO selection.

Parameters Dispense Keypad		
Label	**Database**	**Comments/rules**
Mileage type	• Defines the unit for the N Field. km / Miles	Km/Miles selection

N Field info	• This field will appear on the dispense keypad for every dispense request.
	8 digit numeric free field
	`Free Numeric`
	`--------`
		YES/NO selection

AN Field	• This field will appear on dispense keypad for every dispense request.
	10 digit alphanumeric free field
	`Free Alphanumeric.`
	`----------`
		YES/NO selection.

Timeout Should not be changed!	• This timeout is the amount of the dispense keypad sit idle (no buttons pushed) during the dispense request process prior to return to the main screen. • If this timeout is reached prior to completing the request the USER must re-enter PIN to begin WO request.	Enter a decimal value from 10-255. One second increments. Default is 10 seconds.
Top off timer	• The hose inactive timeout controls the amount of time the hose may sit idle before it automatically closes out the work order and lock-out. • This time begins on the hose when it receives the dispense quantity from the dispense keypad.	Enter a decimal value from 0 – 900.
Display timeout	• Controls the amount of time the fluid name is displayed during the dispense process. • Pressing the Enter key on the dispense keypad will override this timeout.	Enter a decimal value from 0 – 900. Default is 600 seconds.
Internal printer	• The dispense keypad will automatically print a receipt of each dispense result.	YES/NO selection. Default is NO.
Buzzer	• Dispense keypad buzzer. • A beep will sound after every button press on the master keypad keyboard.	YES/NO selection. Default is YES:
Keypad timeout Should not be changed!	• Controls the time how long the dispense keypad will wait for the master keypad to send an acknowledgment a request/result. If this timeout is exceeded an error message will be displayed in the dispense keypad.	Enter a decimal value from 1 – 255. One second increments. Default is 30 seconds.
Miscellaneous WO	• Under the specified number the user can always start a dispense. Even if the master keypad is switched off or PC / HOST are not replying for some reason.	Enter six alphanumeric characters.

6.5.3. Host configuration

The configuration of the host protocol is described in a separate manual.

6.6. Menu: Entity

6.6.1. Fluid / Product configuration

Up to 16 fluids can be defined in the system.
The fluid id is a two-digit number controlled by the system and is assigned when a new fluid is added. The fluid name can up to 16 alphanumeric characters in length.

To add a new fluid type the fluid name in the new fluid label box and click create. The new fluid will be added and will appear on the screen next to its fluid ID number.

To modify an existing fluid name type the new name in the box next to the one to be modified and click the modify button. The name of a fluid that is associated with a tank cannot be changed.

To delete a fluid check the box next to fluid you wish to remove and it will be deleted. A fluid that is associated with a tank cannot be deleted.

6.6.2. Tank configuration

Up to 16 tanks can be defined in the system.
The tank id is a two-digit number controlled by the system and is assigned when a new tank is added.
To add a new tank, select the unit of measure for dispensing from the new unit pull down menu just below the list of tanks. Then enter the tank capacity and click the create button.

To change the current level of a tank, type in the level in the new level box and click modify. The actual level of the tank can be updated only after the tank has been associated to a fluid.
To delete a tank click on the delete box next to the tank to be remove and it will be deleted. A tank that is associated with a fluid cannot be deleted.

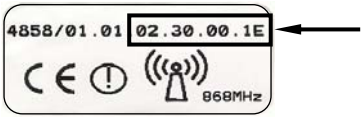
6.6.3. Hose (Meter) configuration

Up to 250 meters can be defined in the system. Hose and meter are synonymous terms. The hose Id is a four-digit number controlled by the system and is assigned when a new meter is added.
The meter address is found on a tag inside the battery compartment of the meter. The format of the address is x.xxx.xxx.xxx and is a 10-digit number. When the address is entered the decimal points must be entered in the correct position as found on the address tag.
To add a meter to the system, enter the meter address in the new hose address box and click the create button. The system will assign the hose id number automatically.
To delete a meter click the delete box next to the meter to be removed from the system. A meter that is associated in the network tree cannot be deleted.

6.6.4. Dispense keypad configuration

Up to 32 dispense keypads can be defined in the system.
The dispense keypad id is a four-digit number controlled by the system and is assigned when a new keypad is added.

The keypad address is found on a tag on the backside of the keypad. The format of the address is xx.xx.xx.xx an 8-digit number.



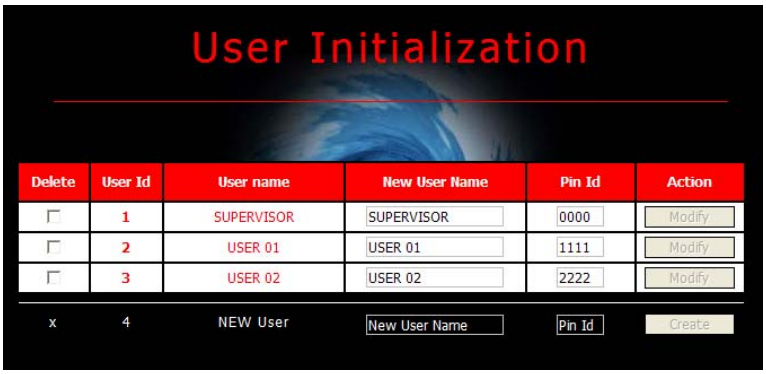
Keypad address

When the address is being entered the decimal points must be entered in the correct position as found on the address tag.

To add a keypad to the system enter the keypad address in the new dispense keypad address box and click the create button. The system will assign the keypad ID number automatically.

To delete a keypad, click on the delete box next to the keypad to be removed from the system. A keypad that is associated in the network tree cannot be deleted.

6.6.5. User configuration



The purpose of this screen is to manage user information for the system. From this screen you can add and delete a user or update current user information. The system can have up to 250 users with User ID 1 being reserved for the supervisor PIN ID. The supervisor PIN ID is used for access to management screens on the master and dispense keypads.

To create/add a new user to the system, in the box next to NEW User, type in the user name and the desired pin number and click create.

- The PIN ID number has four-digits. Leading zeros must be included.
- The user name can be up to 16 characters in length.
- **Note: 8888 is a reserved PIN ID and cannot be assigned to a user.**

To delete a user click the delete box next to the user to be deleted and the user will be removed.
The user will be deleted when the box is checked.

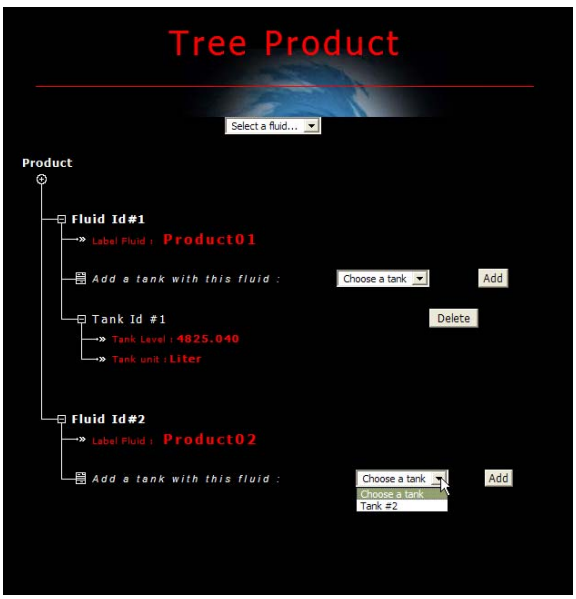
CAUTION: To modify an existing user name, enter the information into the new user name box next to the name to be changed and click the modify button.

To change a user password, enter the new password in the PIN ID box of the one to be changed and click modify.

CAUTION: Changing of a user password requires that the system be updated through the “Send User” function from the KPS system *(see chapter 7 „KPS* software*“).*

6.7. Tree menu

6.7.1. Tree product



The product tree is used to link the fluid ID to the tank that the fluid resides in.

Tanks are first defined in the entity tank, detailing the size of the tank and unit of dispense for the fluid in the tank. The fluid types must also be defined under the entity fluid screen before they will show up in the product tree.

The product tree will display the fluid ID number and the fluid name for all fluids that are set up. To associate a tank to a fluid, select the tank from the pull down list next to "*Add a tank with this fluid*" under the desired fluid branch. Then click the add button. The tank ID, tank level and dispensing unit will then be displayed below the fluid ID.

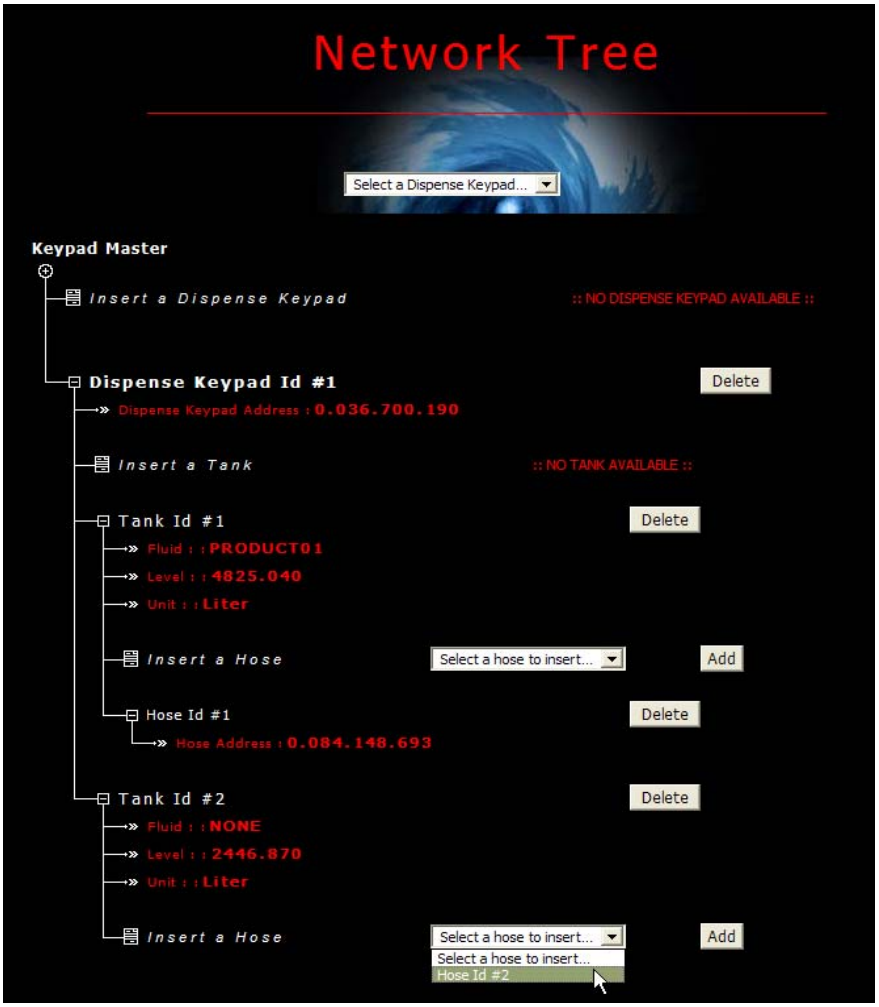
When a tank has been associated to a fluid it will no longer appear in the pull down list. Multiple tanks can be selected under a fluid. When all tanks are associated to a fluid the pull down list will no longer be available.

A tank can be removed from the tree by clicking the delete button next the tank ID on the screen. This only removes the tank from the association to the fluid. The tank is still in the system and can be associated to a different fluid.

Notes:
1. The tank level may only be updated after the tank has been associated with a fluid.
2. A tank can only be attached to a dispense keypad after the tank has been associated with a fluid.

6.7.2. Network tree

The network tree is used to link the dispense keypads, tanks and meters. The network tree graphically shows the association of the hardware components.



The first step is to add all dispense keypads to the network tree.
To add a dispense keypad to the network tree, use the pull down next to the "*Insert* Dispense Keypad*"* on the screen and then click the add button.
After the dispense keypads are selected the next step is to select the tanks that are to be associated to the individual dispense keypad.

To select a tank under a dispense keypad use the pull down list next to the *insert a tank* branch.
Note:
You must associate each tank to each dispense keypad where a hose/meter will be used to dispense fluid from that tank.

The next step is to associate the hose/meter that is going to be accessed from the dispense keypad.
To add a hose/meter to the network tree, use the pull down next to the insert a hose on the screen and click the add button.

Cont. Network Tree

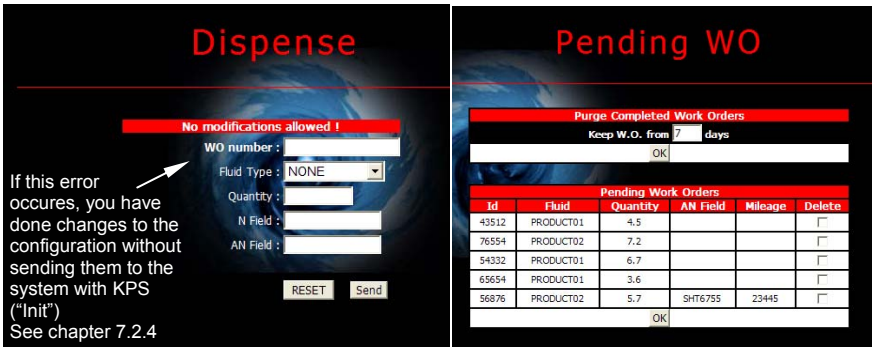
Notes**:**

- ✓ A hose/meter can only be associated to one dispense keypad. In operation a hose/meter can only be selected from this keypad.
- ✓ When a component is selected from a list it will no longer be included in the pull down list.
- ✓ In accordance to that if no component is available to be added, the according pull down list will not be present.
- ✓ To remove a component from the network tree click the delete button next to it. It will only be removed from the tree but not completely be deleted from the system.

After having changed anything at the network tree you must transmit the changes to the master keypad with the KPS-Software *(see chapter 7 „KPS* software*").*

6.8. Menu: Dispense

The dispense screen is used to enter work orders into the system. This would be the normal operation screen used.



Operation:

1. Enter the work order number
2. Select the desired fluid type from the pull down menu
3. Enter the fluid quantity
4. Optional Enter N-Field *(if activated)*
5. Optional Enter AN-Field *(if activated)*
6. Click the send button

To abort the work order entry in process, click the reset button.

Note: The quantity is based on the tank unit. The meter must be programmed to dispense in the same unit as the tank.

The queuing feature of the system allows work orders to be entered into the system to be dispensed at some point in the future. There is no need to pre-determine or select the hose to be used for dispense before it is going to occur. The operator will select the work order to be worked on from the dispense keypad. The hose selected at that time will be verified for the correct fluid and the dispense quantity will be sent to the meter.

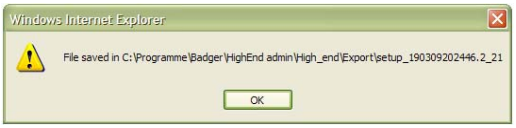
6.9. Menu: File

6.9.1. Setup file

In this menu item the configuration setup can be saved in a file as well as saved files can be re-accessed.

The saved file contains the following parameters:
Setup > System configuration > Configuration > Host Protocol
Entity > Fluid> Tank > Hose/Meter > Dispense Keypad > User
Tree > Fluid-Tank > Network

All saved files are located in the following directory:
C:/Program files/Badger/High-end Admin/High End/Export/



Example file: Setup_190309202446.2_21.
091003132747 -> Date and time of the storing in DDMMYY HHMMSS
.2_21 -> Database version

Save setup file:
The underlined blue link gives you the possibility to save the setup file to a different location.
Move on the curser on the link and click the right mouse to open the context menu.
Choose “Save target as” and select the desired location.
Change file format to “*.*” and click on “Save”.

Open setup file:
To access a saved file click on the “Browse…” button and select the setup file.
Click on open in order to load the file into the database

Note:

- ✓ It is highly recommended to save the setup file to another location.
- ✓ If you open a stored file the actual settings will be irrecoverably overwritten.

6.9.2. Pending work orders file

In this menu item the saves pending work orders in a file as well as saved files can be reaccessed. The underlined blue link gives you the possibility to save the setup file to a different location.

Note: If you open a stored file, the actual settings will be irrecoverably overwritten.

The file will be saved as:
C:\Program files\Badger\HighEnd admin\High_End\Export\ongoing***.2_21

6.9.3. Closed work orders file

In this menu item the saves work orders in a file as well as saved files can be re-accessed. The underlined blue link gives you the possibility to save the setup file to a different location.

Note: If you open a stored file, the actual settings will be irrecoverably overwritten.

The file will be saved as: C:\Program files\Badger\HighEnd admin\High_End\Export\wo***.2_21

6.9.4. Database file

In this menu item the saves whole database in a file as well as saved files can be re-accessed. The underlined blue link gives you the possibility to save the setup file to a different location.

The file will be saved as: C:\Program files\Badger\HighEnd admin\High_End\Export\db***.2_21

The saved file contains the following parameters:

Setup	> System configuration > Configuration > Host Protocol
Entity	> Fluid> Tank > Hose/Meter > Dispense Keypad > User
Tree	> Fluid-Tank > Network
WOs	> Pending WOs > Closed WOs

Note: If you open a stored file, the actual settings will be irrecoverably overwritten.

6.9.5. Export file

Here you can create a data file which can be imported by spreadsheets, word processors or databases. The underlined blue link gives you the possibility to save the setup file to a different location.

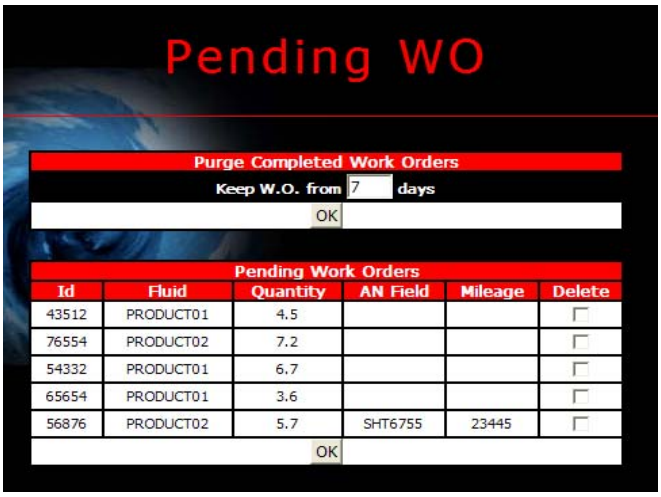
The format is an ASCII-Code (*.csv).

Export file example:

	A	B	C	D	E	F	G	H	I	J	Bearbeitungsleiste
1	Id	Garage hose	User	Date-time	Wo number	quantity	AN Feld	N Field	error1	error2	error3
2	134	2	2	18/06/2004 - 10:49	1	0.000		0	0	0	0
3	135	2	2	18/06/2004 - 13:34	111	0.000		0	64	0	0
4	136	2	2	18/06/2004 - 13:46	2	0.000		0	0	0	0
5	137	2	2	18/06/2004 - 13:46	1	0.000		0	0	0	0
6	138	2	2	18/06/2004 - 13:46	2	8.200		0	8	0	0

The export file will be saved as:
C:\Program files\Badger\HighEnd admin\High_End\Export\export*.csv

6.9.6. Purge pending WO



In order to purge completed work orders from the REPORT BY WO list, choose the "Pending WO" menu

Enter the number of days you wish to KEEP and click the OK button. The order history prior to this number of days selected will be deleted from the database. Be sure that you have selected the time frame you want to keep before clicking the OK button.

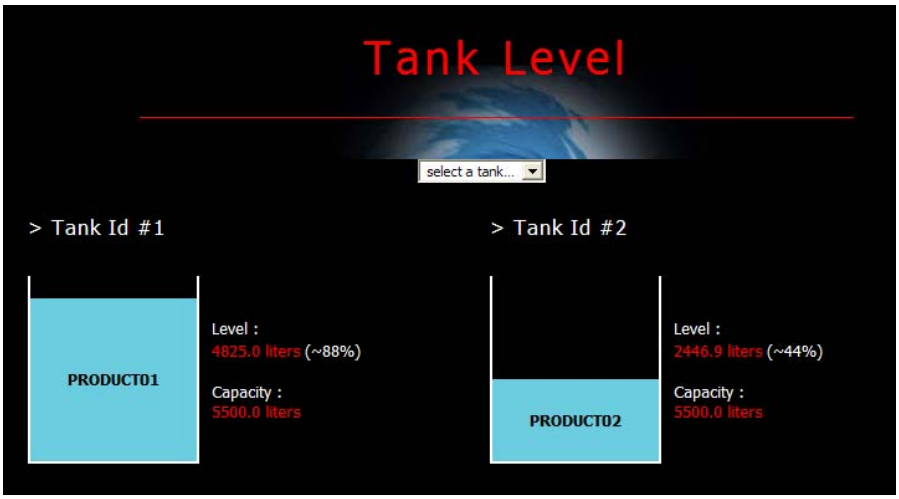
To delete a sole pending work order click the id box of the work order and then click the OK button.

Notes:

- ✓ It is recommended that you save the work order results using file export prior to purging.
- ✓ The list: "Pending work orders" must be empty before any configuration can be transmitted to the master keypad by the KPS software.

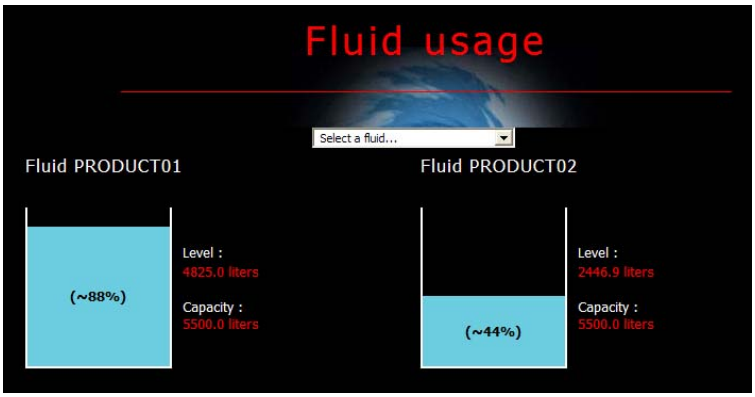
6.10. Menu: Display

6.10.1. Tank level



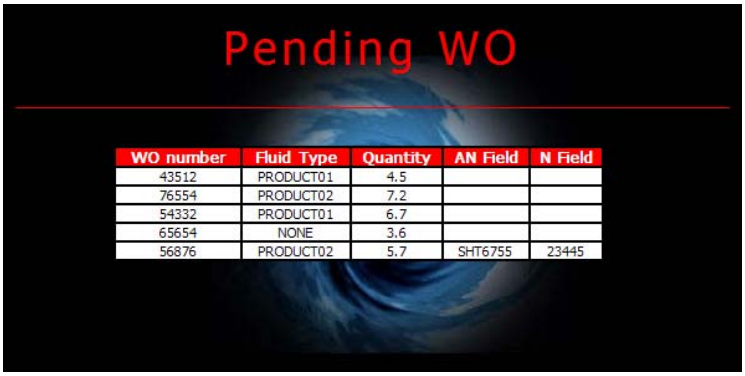
The tank level screen is for informational purposes only. It shows graphically the level of the fluid in the tank, fluid type and tank capacity.

6.10.2. Fluid usage



The fluid usage screen is for informational purposes only. It shows graphically the total volume of fluid available. For example, if two tanks have the same fluid, the tank capacities are summed and the percentage of fluid available is based on the summed value.

6.10.3. Pending WO

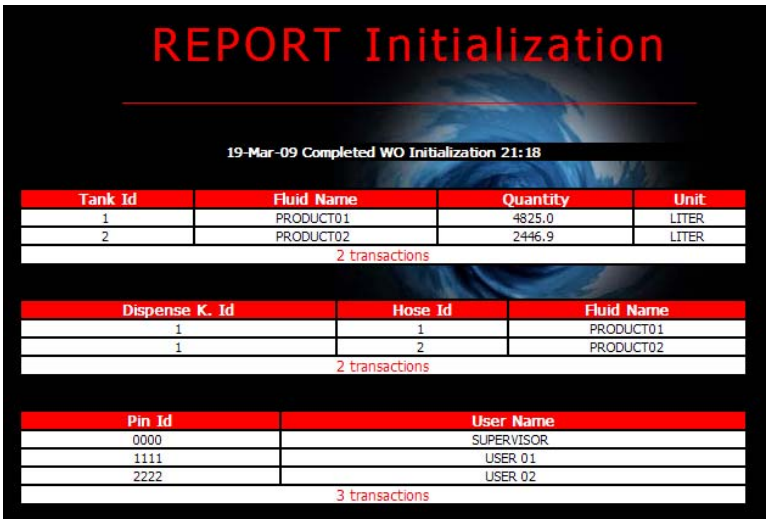


WO number	Fluid Type	Quantity	AN Field	N Field
43512	PRODUCT01	4.5		
76554	PRODUCT02	7.2		
54332	PRODUCT01	6.7		
65654	NONE	3.6		
56876	PRODUCT02	5.7	SHT6755	23445

The pending work order screen shows all of the work orders in the systems that are available to be selected. After a work order is completed the work order will be removed from pending WO and the dispense results will be added to the work order history file. Work order history can be accessed by clicking on the LOGO in the upper left corner.

6.11. Menu: Report

6.11.1. Report initialisation



Tank Id	Fluid Name	Quantity	Unit
1	PRODUCT01	4825.0	LITER
2	PRODUCT02	2446.9	LITER
2 transactions			

Dispense K. Id	Hose Id	Fluid Name
1	1	PRODUCT01
1	2	PRODUCT02
2 transactions		

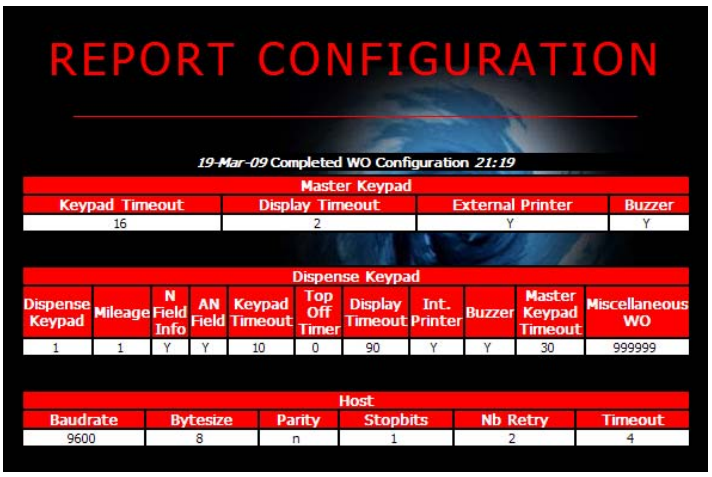
Pin Id	User Name
0000	SUPERVISOR
1111	USER 01
2222	USER 02
3 transactions	

This display provides an overview of the system entity and the associated data.

The first section shows the relationship of the tank Id to the fluid type, the quantity in the tank along with the unit of measurement.
The second section shows the ID of the dispense keypad and the hose/meter ID numbers. It also shows the fluid dispensed from each hose/meter.
The third section shows the system users and their four-digit pin ID number.

No data can be modified from this screen.
To return to the main menu options, click on the Badger LOGO in the upper left corner.

6.11.2. Configuration



This display provides an overview of the system configuration data.

No data can be modified from this screen.
To return to the main menu options, click on the LOGO in the upper left corner.

6.11.3. Work order

REPORT BY WO
Print
Refresh
Export
User : All
Fluid : All
Hose : All
Id WO : All
From (mm-dd-yy):
To (mm-dd-yy):
OK
22-Mar-09 REPORT BY WO 22:20
8 record(s)
Items per Page: 500
Status code definitions
Id WO
Date - Time
AN Field
Qty
Status1
Status2
Status3
User
Fluid
Hose
25688 20-Mar-09 - 16:17 5.215 0 0 0 USER 01 PRODUCT01 1
256998 20-Mar-09 - 16:15 2.030 2 0 0 USER 02 PRODUCT02 2
MP25568 20-Mar-09 - 16:15 6.420 0 0 0 USER 01 PRODUCT01 1
25699 20-Mar-09 - 16:14 9.335 2 0 0 USER 02 PRODUCT02 2
112568 20-Mar-09 - 16:13 2.620 0 0 0 USER 02 PRODUCT01 1
2566 20-Mar-09 - 14:29 1.020 0 0 0 USER 01 PRODUCT01 1
1255 20-Mar-09 - 14:28 2.020 0 0 0 USER 02 PRODUCT01 1
2588 20-Mar-09 - 14:28 1.020 0 0 0 USER 01 PRODUCT01 1
Total: 29.68
8 record(s)

This display provides an overview of the closed work orders. The sorting can by defined by clicking on the headline of the column you want to sort by. By clicking on the head line a second time, the sorting order will be turned over.

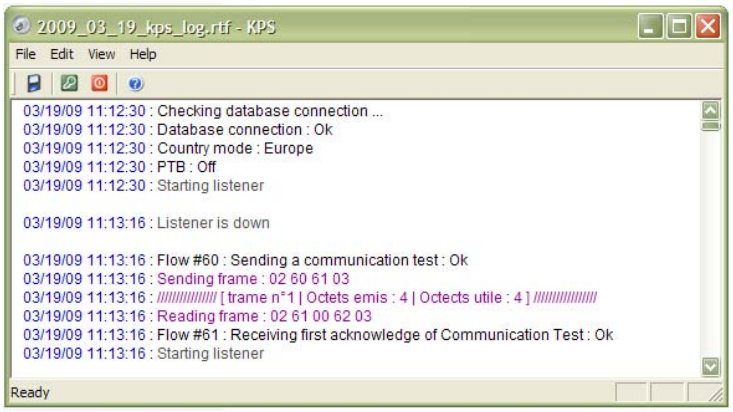
Choosing the criteria from the drop down menu will sort the list by the selected criteria.

Set the period you want to for the data to be shown.

To return to the main menu options, click on the Badger LOGO in the upper left corner.

7. KPS software v0.5.2

After the settings in the OMS software have been done, they are only stored in the MySQL database and must be transmitted to the master keypad in a second step. This will performed by the KPS software (Key Pad Server Program).

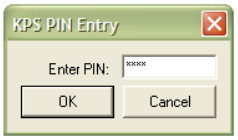

2009_03_19_kps_log.rtf - KPS
File Edit View Help
03/19/09 11:12:30 : Checking database connection ...
03/19/09 11:12:30 : Database connection : Ok
03/19/09 11:12:30 : Country mode : Europe
03/19/09 11:12:30 : PTB : Off
03/19/09 11:12:30 : Starting listener
03/19/09 11:13:16 : Listener is down
03/19/09 11:13:16 : Flow #60 : Sending a communication test : Ok
03/19/09 11:13:16 : Sending frame : 02 60 61 03
03/19/09 11:13:16 : //////////////// [trame n°1 | Octets emis : 4 | Octects utile : 4] ////////////////
03/19/09 11:13:16 : Reading frame : 02 61 00 62 03
03/19/09 11:13:16 : Flow #61 : Receiving first acknowledge of Communication Test : Ok
03/19/09 11:13:16 : Starting listener
Ready

The KPS software is launching automatically together with the MySQL and Apache databases when starting a windows session.

The KPS is always running in the background. The control window can be opened by a double click on the KPS icon at the lower right corner in the task bar.

Taskbar in the right lower corner of the screen

PIN verification is required to open the Window.
Enter the system password defined the OMS software.
See also chapter 6.5.1 (Default 0000).



7.1. The KPS tasks

- The KPS transmits the configuration data from the PC (OMS software) to the master keypad
  The master keypad will configure the attached dispense keypad via RF.

- In case the “WO Validation PC” is switched on, the KPS will respond the oil request from the master keypad.

- The finished dispense results send by the master keypad will be stored on the PC (MySQL database). See also REPORT BY WO in the OMS software.

  “*Archive on PC”* has to be activated on the master keypad.

7.2. KPS - a first check

Before using the KPS some requirements have to be fulfilled:

1) Ensure that the RS232 COM port at the PC is connected with the RS232 port of the master keypad (9 pole plug at the front side keypad housing).

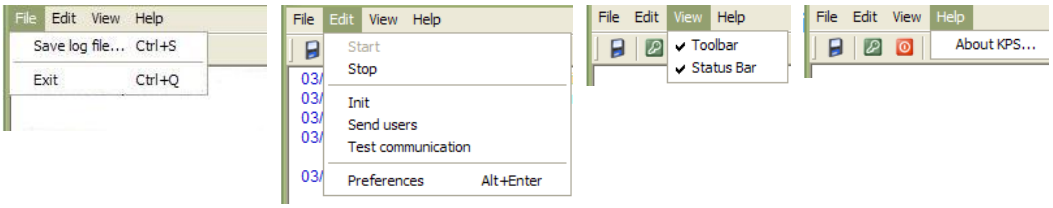
2) Check that in the KPS under “Edit >> Preferences“ has been set to correct COM port.

Note: In case there is not COM Port available. We do not recommend using a USB to serial converter (USB adapter), try to use instead a RS232 card (either PCI or PCI-Express). USB converters can sometimes not provide a continuous dataflow which causes random communication errors.

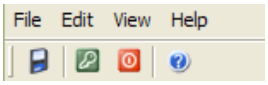
7.2.1. Menu overview

The following pages will explain the settings and functions of the KPS software.

Menu File Protocol files can be stored and the software can be shut down.
Menu Edit All settings are made.
Menu View The tool bar and the status bar can be shown or hidden.
Menu Help Information about the software release

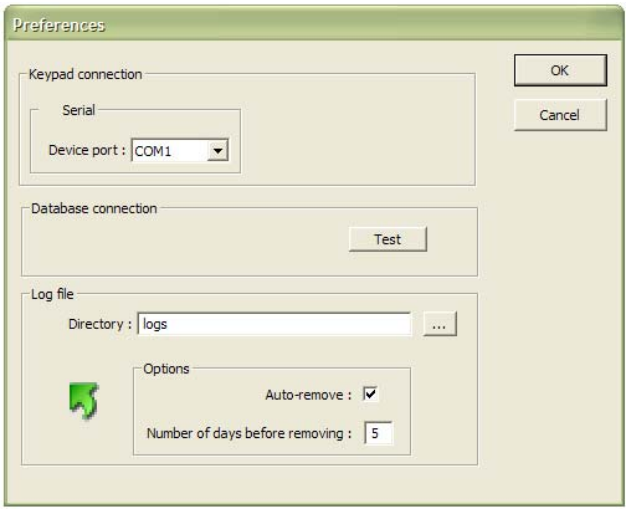


The tool bar contains the following icons: Save, Start, Stop, and Help



7.2.2. Preferences

Choose "Preferences" from the menu “Edit“ and the following window will open up:



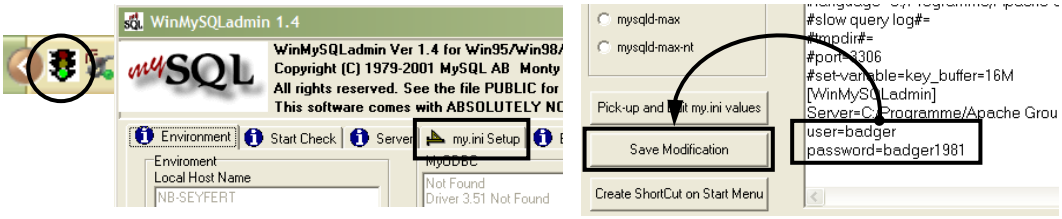
Keypad connection:
Choose the COM port you have used on your PC to connect the master keypad.
Please restart the KPS if you changed to different the COM port.

Database connection:
You ensure a correct connection to the MySQL data base.
To test the data base connection click on the Test button.
A message will appear ahead the button: *Database connection: OK*

If the database connection failed, you have most probably entered the wrong user name or password. Pay attention, they are case sensitive. You had entered during the MySQL installation.

User: badger
Password: badger1981

In case you have double check the entered data, click on the MySQL database icon and choose “Show me”. Select the tab “my.ini Setup”. Change data if necessary and click on “Save Modification”.
Select the Environment tab and click on “Hide me” to close the MySQL window.



Log file:
The log file will help to evaluate a communication problem as it provides an archive the KPS communication over the specified time.

The path can be defined, default is C:\Program files\Badger\KeyPad Server\KPS\logs.
The file format is *.rtf.

7.2.3. Test communication between KPS and master keypad

Choose "Test communication" from the menu “Edit.

A successful communication will show the following lines:
03/20/09 19:06:44 : Flow #60 : Sending a communication test : Ok
03/20/09 19:06:44 : Sending frame : 02 60 61 03
03/20/09 19:06:44 : ////////////////// [trame n°60 | Octets emis : 1442 | Octects utile : 1442] //////////////////
03/20/09 19:06:44 : Reading frame : 02 61 00 62 03
03/20/09 19:06:44 : Flow #61 : Receiving first acknowledge of Communication Test : Ok
03/20/09 19:06:44 : Starting **listener**

03/20/09 19:06:44 : Listener is down
03/20/09 19:06:44 : Starting listener

Problem 1: The master keypad does not respond.
03/20/09 19:15:23 : Flow #60 : Sending a communication test : Ok
03/20/09 19:15:23 : Sending frame : 02 60 61 03
03/20/09 19:15:33 : Timeout error number 0
03/20/09 19:15:33 : Waiting 2 seconds ...
03/20/09 19:15:35 : Trying to resend last frame [1 / 6]

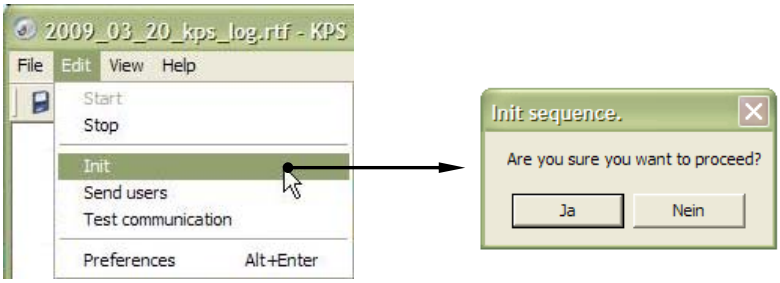
- Check that the cable is properly connected
- Ensure that the master is up and running, you may reboot the master just in case.

Problem 2: The serial port is not available.
03/20/09 19:21:35 : ERROR : Serial connection failed.

- Check in the windows hardware menu if the selected COM port is available
- Ensure that no other program is using the same port.

7.2.4. Init (transmit configuration settings)

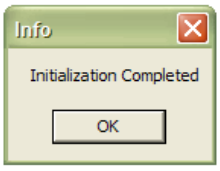
This function will transmit the configuration settings or changes made in the OMS software, the master keypad will configure the attached dispense keypad via RF.



The first step in the init procedure will be to lock remotely the attached dispense keypads. This will ensure, that no will accidently start a new dispense while the init is running.

Important: All configured dispense keypads must be switched on and accessible.

When the init has been finished, you will see the following window:



Note: It may happen, that one of the attached dispense keypad has still an ongoing dispense. In this case, the above mentioned locking procedure will fail. You would need to finish the ongoing dispense or clear the ongoing work orders by using the MET menu in the dispense keypad (see also chapter 4.4).

Red lines and a pop up window will mark indicate a problem.

7.2.5. User (Transmit only user data)

Use this function is used to transmit only the user settings to master keypad in order reduce the time of initialisation.

Note: To prevent interrupts in the work flow we recommend changing settings in the evening or in low commerce volume periods.

8. Troubleshooting

8.1. Dispense keypad error messages

These error messages can be displayed by the dispense keypad. The associated action to reset the system is listed behind.

Message	Messages at the dispense keypad
`Hose active hit hose reset`	The selected meter currently has a dispense order in waiting to be processed, complete the active order. ⇨
`WO refused`	The entered work order number is not valid and has been refused by host or OMS software.
`Master is down`	The master does not respond to a request from the dispense keypad
`PC is down`	The OMS software (KPS) is not responding to the master keypad. Only if WO validation PC is activated.
`HOST is down`	The HOST (DMS) is not responding to the master keypad. Only if “WO Validation HOST” is activated.
`Host or PC is occupied`	Master keypad is occupied by another job. ⇨
`Wrong hose for fluid`	The meter selected is not a valid meter for the fluid assigned for this WO. ⇨
`RF communication`	Communication is in progress, please wait (10 sec).

Message	Messages at meter
F1	An error occurred during the RF transmission. ⇨
F2	The RESET button has been pressed and no response arrived within 12 sec - timed out. ⇨
Display flashes	A pulse error occurred during the dispense, only valid for PTB version. ⇨
↑↓	RF communication is in progress, please wait (10 sec)
HISTORY	A dispense result could not be sent and has been saved in the "Out of Sequence" memory. ⇨

⇨ **Press once more the RESET button at the meter**

8.1.1. Problem: PC or HOST is not responding

Message

Master down	HOST down	PC down

Problem: Master keypad or Host (DMS) is not answering during the predetermined period.

1. Check the RS-232 cable connection.
   Note: Shut down the PC before (un-)plugging the cable connector.
2. If WO-validation >> PC is activated

✓ Check if the KPS software is running

A differing KPS icon in the windows task bar indicates the status of the KPS

A green dot in the KPS icon indicates a running KPS.

A red cross on the KPS icon indicates that the KPS has been stopped. Open the KPS window and click on the green key button in the tool bar.

If there is no KPS icon at all start the KPS manually from the start-up menu (launch KPS)

✓ Carry out a communication test between the master keypad and the PC (see chapter 7.2.3 „Test communication between KPS and master keypad“)

3. If WO-validation >> Host is activated

✓ Check if the host answer is coming in during the predetermined period.
✓ To check the host interface a host can be simulated by using a keypad program.

8.1.2. Problem: "Communication Error"

Indicates a missing RF communication between the master and the dispense keypad.

1. Check the connection between master and dispense keypad by using the “emergency mode >no” function (see chapter “Emergency mode“).
2. Check the connection between master and dispense keypad by using the menu TRM. See chapter „Menu DK (test communication)“.
3. Check if a keypad has been unplugged / if the power supply has been cut off.
4. Is the antenna’s BNC plug locked properly?
5. Are there any obstacles like containers, roll cages, buses or trucks nearby the antenna?
6. De-energize the keypads for at least 20 seconds.

8.2. Other problems

Problem – RF Meter	Description and error recovery
F02 on the main display	The meter did not get a reply from the dispense keypad. This may happen, because another meter is sending data in this very moment or the dispense keypad is communicating with the master. Press 2xRESET start the communication again.
The **AUTO** function is shut off; the AUTO icon disappeared and cannot be activated again.	The battery sign is flashing in the lower left corner. This means the battery power is too low to run the auto function. The meter can still run in manual mode. Change the batteries.
It is not possible to set back the meter from **AUTO** mode to standard pre-selection mode.	For a new installation, check if the RF-ID number is correct. For a running installation, send an "Init" to reinitialise the database in the dispense keypad (see chapter 7 "KPS Software").
Problem – Keypad	**Description and error recovery**
Message at the master keypad: „Order List not Empty not empty"	The master keypad stores transaction sorted by date and time. Due to this, you have to "Clear Transactions" (CNF menu) first and then change date and time.
The screen shows only "Reloading Parameter" and does not proceed.	Data database of the keypad is most likely corrupted; this may happen due a bad power supply line. To resolve this, power down the keypad and press and hold the button 1 and 2 until you see "Confirm erase". Choose YES and perform a memory erase. At the end of this process you have to reboot the Keypad and send an "Init" over the KPS to initialise the data again.
Random Communication Errors on the dispense keypad.	The RF-Signal seems to low; perform the LNK test to check the link quality. You can various types of remote antennas to improve the signal strength.
Problem – OMS KPS software	**Description and error recovery**
No actual dispense data are shown in the OMS software.	✓ Check if the Archive on PC is activated in the Master. ✓ Click on the Badger Logo in the upper left corner to refresh the work order list. ✓ Carry out 7.2.3 "Test communication between KPS and master keypad". Transactions that have not reached the PC yet, will be transmitted.
KPS, "Init" stops with red error message.	✓ Check first if the master keypad responds. See chapter 7.2.3 "Test communication to the Master" ✓ Check if all dispense keypads are powered on. ✓ Check if there is no ongoing dispense in a dispense keypad". Use the menu MET to remove pending WOs. See chapter 4.4 "Delete prepared WO"

9. Worksheets

Fluid ID	Fluid Name
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

A maximum of 16 products.
The alphanumeric name, max. 16 characters.

Tank ID	Fluid	Tankvolume	Unit	Content
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Maximum 16 Tanks.
Tank volume format: 00000.000.

Keypad ID	Adress xx . xx . xx . xx			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Max. 12 dispense keypads.
RF keypad address is an 8 digit number.

Meter ID	Adress x . xxx . xxx . xxx
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

Max 99 meters/hoses.
The address is a 10 digit number.

Dispense Keypad **ID 1**			
	Fluid	**Tank ID**	**meter number**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Max. 24 meters per keypad.

Dispense Keypad **ID 2**			
	Fluid	**Tank ID**	**meter number**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Dispense Keypad **ID 3**			
	Fluid	**Tank ID**	**meter number**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

User ID	Name User	PIN ID
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		

Up to 250 users. The user field is alphanumeric, max. 16 characters.
The user PIN ID is a 4 digit number.

10. Appendix I: Host communication

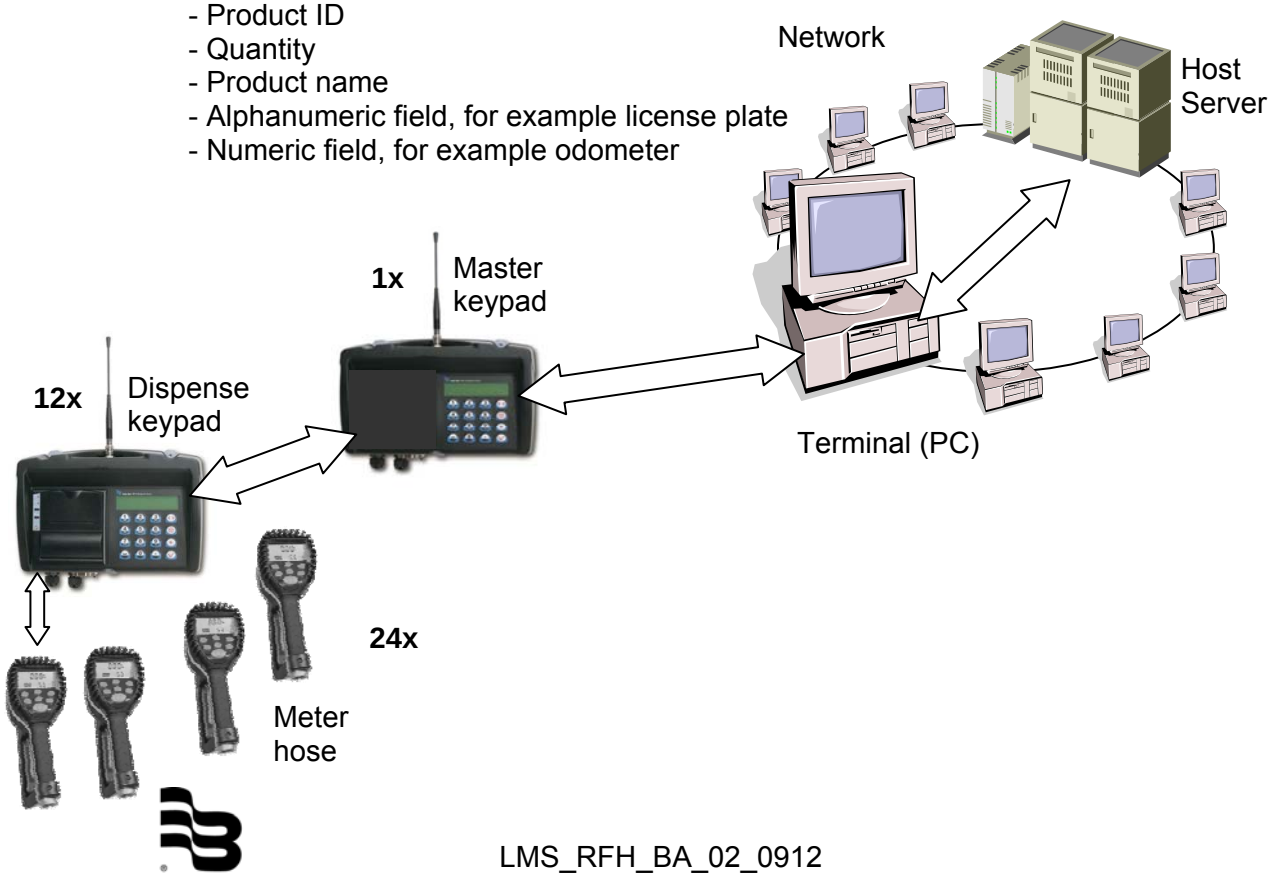
The direct connection between host computer and RF system will be established through a serial interface RS232 (V24) at the Master Keypad (MK) based on ASCII code.

STANDARD COMMUNICATION

- The RF system will verify an entered work order number by sending it to the host computer.
- The host computer will check the work order number and will refuse or send a permission.
- Once the transaction is done, the RF system will send the collected data to the host computer.
- The host computer will send a receipt acknowledgement to the RF system.

ADDITIONAL POSSIBILITIES

- The communication strings can be edited through the PC software. The field definition and sequence are free adjustable.
- Start and end of data field can be defined (ASCII code).
- Data field separator can be defined (ASCII code).
- If the host computer is not available, a miscellaneous work order number can be entered.
- The retry time, until the RF system will try to resend, and the total retries are changeable.
- All transactions which could not be sent will be tagged and resent as soon as the host computer is reconnected.
- When a work order request has been sent, the host computer can specify the following items in his reply:
  - Product ID
  - Quantity
  - Product name
  - Alphanumeric field, for example license plate
  - Numeric field, for example odometer



EXAMPLE FOR THE COMMUNICATION PROTOCOL

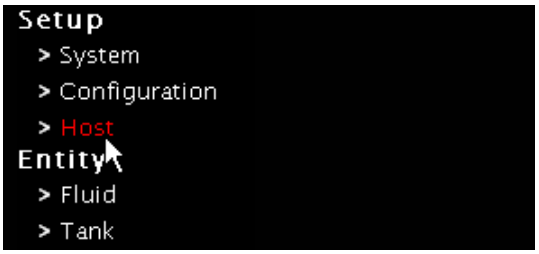
The following communication is based on the default host protocol.

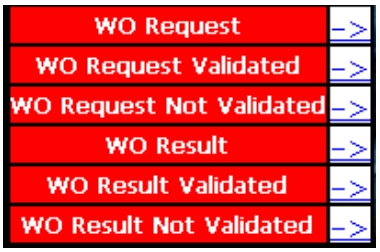
Standard communication (sample)	
>A12345678901<	RF System is sending job request Is work order "12345678901" valid ?
>J12345678901<	Answer Host: Yes, valid!
>N12345678901<	Or answer: No, not valid!
>D1046003212345678901052701 0353 <	RF-System is sending the WO result to the host computer. Description: **D1** indicates this is the WO result, **046** Day of the Year (15.02.2002), **0032** Transaction n°, **123...** WO n°, **527** PIN n°, **01** Hose or meter n°, **Blank** This is an approved dispense, **0353** Quantity 3,53 liters, **Blank** Send for first the time.
>J12345678901<	OK, WO result received!
>N12345678901<	WO result refused!
>A1234 <	New request for oil
>N1234 <	Host computer answers - NO
	The local display will show for short moment, "WO refused" - No dispense is possible
Other possible scenarios	
>A12345678901<	Request for oil from RF-System
>A12345678901<	
>A12345678901<	.. again each 5 sec. (default)
>J12345678901<	Host computer anwers - OK
>D1046003212345678901052701 0353 <	After the dispense the data arriving at the host
>D1046003212345678901052701 0353#<	... in total 10 times each 5 sec (default)
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	
>D1046003212345678901052701 0353#<	..
>D1046003212345678901052701 0353#<	After 10 retries it will stop = timed out
>A123456ABCEF<	New request for oil
>J123456ABCEF<	Host computer answers - OK
>D1046003212345678901052701 0353#<	The old transaction will be sent again.
>J12345678901<	Host computer accepts the data
>D1047003312345ABCEF8215 01 0150 <	The new data will be sent now ...
>J123456ABCEF<	OK, acknowledged

To simulate the host computer during the test period we have found, that the terminal program of Windows 3.11 is very helpfull. Can be sent on request.

PC SOFTWARE - SPECIFY HOST PROTOCOL SETTINGS

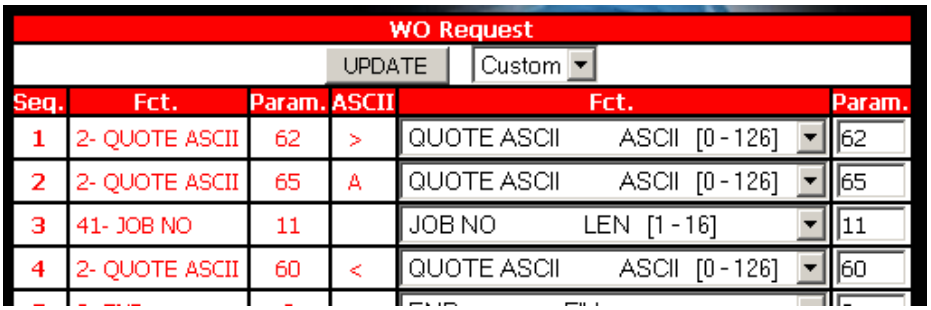
1. >>> Choose





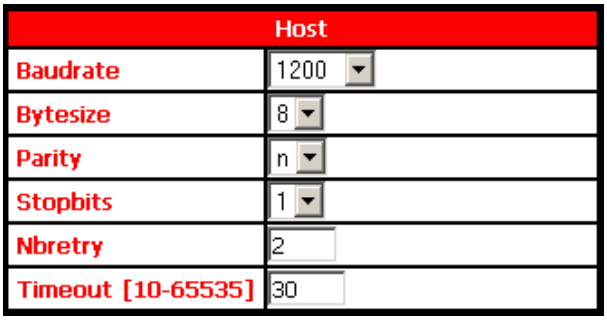
Each communication string can be defined separately.

2. >>> Selecting for example "WO request" you will see


WO Request
UPDATE
Custom
Seq. Fct. Param. ASCII Fct. Param.
1 2- QUOTE ASCII 62 > QUOTE ASCII ASCII [0 - 126] 62
2 2- QUOTE ASCII 65 A QUOTE ASCII ASCII [0 - 126] 65
3 41- JOB NO 11 JOB NO LEN [1 - 16] 11
4 2- QUOTE ASCII 60 < QUOTE ASCII ASCII [0 - 126] 60

- Each field is represented by a sequence number "Seq.".
- By clicking on the "Fct." pull down menu you can see the available functions.
- For more details on each function, please see also point 4 of this appendix.
- ASCII [0-126] will ask for an ASCII code number in the "Param." field (see point 5 of this appendix)
  LEN [1-xx] will ask for a certain field length in the "Param." field.
- Press update before you leave the menu.

3. >>> To change the serial SETUP for the RS232 host connection choose menu SETUP >> SYSTEM



Nbretry = Number of retries
Timeout = The elapsed time in-between the retries

4. >>> FUNCTIONS - Field definitions

No	Function	Type	Description	Can be used in					
				WO-REQUEST	WO-OK	WO-KO	WO-RESULT	WO-RESULT OK	WO-RESULT KO
0	END FIX	-	Field not defined	○	○	○	○	○	○
1	FILTER LEN [1-255]	Length	A blank field (=spacer) might be needed to adapt to certain prot.	-	○	○	○	○	○
2	QUOTE ASCII [0-126]	ASCII	Creates a character	○	○	○	○	○	○
3	RETRY CHAR ASCII [0-126]	ASCII	This field is blank for the first transmission. Any other transmission will show the defined ASCII character.	○	○	○	○	○	○
4	CHECKSUM FIX	-	Binary checksum	○	○	○	○	○	
11	USERNAME LEN [1-16]	Length	The entered user, entered with the PIN ID	○	-	-	○	-	-
12	PIN ID FIX	4 Char.	The entered user at the dispense keypad	○	-	-	○	-	-
21	YEAR FIX	4 Char.	Format YYYY (Date and time of WO result >> when it arrives at the Master Keypad.)	-	-	-	○	-	-
22	MONTH FIX	2 Char.	Format MM	-	-	-	○	-	-
23	DAY FIX	2 Char.	Format DD	-	-	-	○	-	-
24	DAY OF YEAR FIX	3 Char.	Format 001to 365	-	-	-	○	-	-
25	HOUR FIX	2 Char.	Format HH	-	-	-	○	-	-
26	MINUTE FIX	2 Char.	Format MM	-	-	-	○	-	-
27	SEC FIX	2 Char.	Format SS	-	-	-	○	-	-
41	WO NO LEN [1-16] *or JOB NO (old)*	Length	The entered work order number	○	○	○	○	○	○
42	TRANSACTION NO LEN [1-4]	Length	Incrementing number, each transaction has a unique number. Format 0001 to 99999	-	-	-	○	-	-
43	DISPENSE KEYPAD ID FIX *or SLAVE KEYPAD ID (old)*	2 Char.	Gives the dispense keypad ID were the dispense was made.	○	-	-	○	-	-
44	HOSE ID FIX	2 Char.	HOSE ID or meter ID (01 to 99)	-	-	-	○	-	-
45	PRODUCT NAME LEN [1-16]	Length	Alphanumeric field	-	○	-	○	-	-
46	PRODUCT ID FIX	2 Char.	Format 01 to 16	-	○	-	○	-	-
47	TANK ID FIX	2 Char.	Format 01 to 16	-	-	-	○	-	-
48	FREE FIELD 1 LEN [1-8]	Length	Numeric field to be activated under Setup >> Configuration >> Dispense Keypad	-	○	-	○	-	-
49	FREE FIELD 2 LEN [1-16]	Length	Alphanumeric field, same as above.	-	○	-	○	-	-
50	DISPENSE INT LEN [2-3]	Length	Integer part of quantity	-	○	-	○	-	-
51	DISPENSE DEC LEN [2-3]	Length	Decimal part of quantity	-	○	-	○	-	-
52	DISPENSE STAT ASCII [0-126]	ASCII	This field is blank if dispense was an approved dispense. On any error it will show the defined character.	-	-	-	○	-	-

5. >>> ASCII-Code Chart

Dec.	Char	Dec.	Char	Dec.	Char	Dec.	Char
001	[SOH]	033	!	065	A	097	a
002	[STX]	034	"	066	B	098	b
003	[ETX]	035	#	067	C	099	c
004	[EOT]	036	$	068	D	100	d
005	[ENQ]	037	%	069	E	101	e
006	[ACK]	038	&	070	F	102	f
007	[BEL]	039	´	071	G	103	g
008	[BS]	040	(	072	H	104	h
009	[TAB]	041	)	073	I	105	i
010	[LF]	042	*	074	J	106	j
011	[VT]	043	+	075	K	107	k
012	[FF]	044	,	076	L	108	l
013	[CR]	045	-	077	M	109	m
014	[SO]	046	.	078	N	110	n
015	[SI]	047	/	079	O	111	o
016	[DLE]	048	0	080	P	112	p
017	[DC1]	049	1	081	Q	113	q
018	[CS2]	050	2	082	R	114	r
019	[DC3]	051	3	083	S	115	s
020	[DC4]	052	4	084	T	116	t
021	[NAK]	053	5	085	U	117	u
022	[SYN]	054	6	086	V	118	v
023	[ETB]	055	7	087	W	119	w
024	[CAN]	056	8	088	X	120	x
025	[EM]	057	9	089	Y	121	y
026	[SUB]	058	:	090	Z	122	z
027	[ESC]	059	;	091	[	123	{
028	[FS]	060	<	092	¥	124	|
029	[GS]	061	=	093	]	125	}
030	[RS]	062	>	094	^	126	~
031	[US]	063	?	095	_		
032	Space	064	@	096			

11. Manufacturer´s declaration

Badger Meter Europa

CE

Herstellererklärung
Manufacturers Declaration

Bauart Typ *Model Type*	Managementsystem für Flüssigkeiten *Management System for fluids*
Typenbezeichnung *Model Name*	MDS-2000, LMS-RF, LMS-Baby *MDS-2000, LMS-RF, LMS-Baby*
Seriennummer *Serial Number*	Nach Komponenten gelistet *Listet by components*
Baujahr *Year of manufacture*	ab 1997 *from 1997*

Referenz / Reference:

Maschinen Richtlinien *Machine Directives*	CE-Richtlinien Elektrische Betriebsmittel *Electrical Device Directives*
89/392/EEC	73/23/EEC
91/369/EEC	93/68/EEC
94/44/EEC	
93/68/EEC	

Hiermit bestätigen wir die Übereinstimmung unserer Geräte mit den o.g. Richtlinien.
Vor Inbetriebnahme der oben genannten Geräte muss sichergestellt sein, dass die Gesamtanlage bzw. Maschine, in der die Geräte verwendet werden, den geltenden Richtlinien und Bestimmungen entspricht.

We herewith confirm that our products are in accordance with above mentioned directives.
The equipment identified above must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of above directives.

Unterschrift

Geschäftsleitung / Top Management &
Qualitätsmanagement / Quality Manager
E. Wannenwetsch

02.04.2009

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Badger Meter Europa GmbH - Nürtinger Strasse 76 - 72639 Neuffen (Germany)
Tel. +49-7025-9208-0 Fax +49-7025-9208-15 www.badgermeter.de E-mail:badger@badgermeter.de

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12. Warranty

Badger Meter warrants meters and parts manufactured by it and supplied hereunder to be free from defects in materials and workmanship for a period of 18 months from date of shipment or 12 months from date of installation, whichever period shall be shorter. If within such period any meters or parts shall be proved to Seller´s satisfaction to be defective, such meters or parts shall be repaired or replaced at Seller´s option. Seller´s obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Seller´s receiving written notice of any alleged defect within 10 days after its discovery and, at Seller´s option, return of such meters or parts to Seller, f.o.b. its factory. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES WHATSOEVER INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES (EXCEPT OF TITLE) OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Badger Meter shall not be liable for any defects attributable to acts or omissions of others after shipment, nor any consequential or incidental damage whatsoever.

13. DIN ISO certificate

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

Badger Meter Europa GmbH
Nürtinger Strasse 76
D-72639 Neuffen

has established and applies
a Quality Management System for

Flowmetering and Control,
Design, Selling and Production.

An audit was performed, Report No. 70002816
Proof has been furnished that the requirements
according to

ISO 9001: 2000

are fulfilled. The certificate is valid until 2011-02-13
Certificate Registration No. 12 100 24674 TMS

Munich, 2008-02-16

QMS-TGA-ZM-07-92

TÜV SÜD Management Service GmbH • Zertifizierstelle • Ridlerstraße 65 • 80339 München • Germany

Hotline

Tel: +49-7025-9208-0 or -20
Fax: +49-7025-9208-15
E-Mail: LMSRF@badgermeter.de or
badger@badgermeter.de

Badger Meter Europa GmbH
Subsidiary of Badger Meter, Inc.

Nürtinger Strasse 76
72639 Neuffen (Germany)
E-Mail: badger@badgermeter.de
www.badgermeter.de